DRAFT ECONOMIC IMPACT ANALYSIS OF PROPOSED CRITICAL HABITAT FOR THREATENED AND ENDANGERED PLANTS ON MOLOKA‘I

REVISED DETERMINATIONS

August 2002

Draft - August 2002

Prepared for:

Division of Economics
U.S. Fish and Wildlife Service
4401 N. Fairfax Drive
Arlington, VA 22203

Prepared by:

Anden Consulting
P.O. Box 15032
Honolulu, HI 96830

Under subcontract to:

Industrial Economics, Incorporated
2067 Massachusetts Avenue
Cambridge, Massachusetts 02140

Send comments on the economic analysis to:

Field Supervisor
Pacific Islands Fish and Wildlife Office
U.S. Fish and Wildlife Service
300 Ala Moana Boulevard, Room 3-122
P.O. Box 50088
Honolulu HI 96850-0001

TABLE OF CONTENTS

Tables

PREFACE

The U.S. Fish and Wildlife Service has added this preface to all economic analyses of critical habitat designations:

"The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ('Regulatory Planning and Review'), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

> *'The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'*

"When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by federal landowners, federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

"In New Mexico Cattle Growers Ass'n v. U.S.F.W.S., 248 F.3d 1277 (10th Cir. 2001), however, the 10th Circuit recently held that the baseline approach to economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

"In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the consultations and associated project modifications, if any, already

consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the nationwide history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

"Therefore, this analysis incorporates two baselines. One addresses the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the upper bounds of the cost of project modifications based on the benefits and economic costs of project modifications that would be required due to consultation under the jeopardy standard. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

"The other baseline, the lower boundary baseline, will be a more traditional rulemaking baseline. It will attempt to provide the Service's best analysis of which of the effects of future consultations actually result from the regulatory action under review - i.e. the critical habitat designation. These costs will in most cases be the costs of additional consultations, reinitiated consultations, and additional project modifications that would not have been required under the jeopardy standard alone as well as costs resulting from uncertainty and perceptional impacts on markets."

DATED: March 20, 2002

FOREWORD

1. CONTENT AND PURPOSE

This report assesses the economic impacts that may result from the designation of critical habitat for threatened and endangered plant species on the islands of Moloka'i in the State of Hawai'i. It was prepared for the U.S. Fish and Wildlife Service (the Service) to help them in their decision regarding designating critical habitat for the plant species.

As required by the Endangered Species Act, as amended (the Act), the decision to designate a particular area as critical habitat must take into account the potential economic impact of the critical habitat designation. If the economic analysis reveals that the economic impacts of designating any area as critical habitat outweigh the benefits of designation, then the Service may exclude the area from consideration, unless excluding the area will result in the extinction of the species.

The focus of the economic analysis is on section 7(a)(2) of the Act which requires consultation with the Service and possible project modification for certain projects and activities that may affect a species listed as threatened or endangered, or the habitat of a listed species. The consultations and possible project modifications will have economic impacts which, in this report, are referred to as "section 7 economic impacts" to distinguish them from the economic impacts related to other sections of the Act. Other sections of the Act are outside the scope of this economic analysis.

2. ORGANIZATION

This report is organized into six chapters:

— Chapter I: The Listed Plants and Proposed Critical Habitat

This chapter provides relevant information on the plant species and the proposed critical habitat units.

— Chapter II: Physical and Socioeconomic Profile of Maui County

To provide the context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents a physical description of the islands of Maui County and the socioeconomic profile of Maui County.

— Chapter III: The Endangered Species Act

Relevant information from the Act is presented in Chapter III, including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service, and the definition of taking and other restrictions.

— Chapter IV: Existing Protections

This chapter presents information on existing regulations and land management policies that protect wildlife species or their habitats.

— Chapter V: Approach to the Economic Impact Analysis

This chapter gives the general approach used to estimate section 7 economic impacts of the species listing and the critical habitat designation.

— Chapter VI: Economic Costs and Benefits

This chapter discusses planned projects, activities and land uses in the proposed critical habitat units and estimates section 7 economic costs and benefits. This chapter also identifies the effects which can be attributable solely to the critical-habitat provisions of section 7.

After learning about the proposed critical habitat (Chapter I), readers who are already familiar with Maui County (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the approach to conducting the economic analysis (Chapter V) may wish to skip these chapters, as appropriate, and proceed to the economic analysis (Chapter VI).

3. TERMINOLOGY

The following Service terminology is *italicized* throughout this document for the benefit of readers who are unfamiliar with it and want to be reminded that the Service has given specific meanings to these words and terms: *Federal involvement, Federal nexus, occupied, unoccupied*, *primary constituent elements, jeopardy, adverse modification,* and *take.* The terms are explained in the body of the report.

4. ECONOMIC CONSULTANTS

The analysis was performed by Anden Consulting, based in Honolulu, Hawai‘i, under subcontract to Industrial Economics, Inc. (IEc), an economic consulting firm in Cambridge, Massachusetts. In conducting the analysis, Anden Consulting worked in Hawai‘i with the Service and with Hawai‘i government agencies, companies, and organizations listed in the References. Decision Analysts Hawai‘i, Inc. (DAHI)–a Hawai‘i based economic consulting firm under subcontract to IEc–conducted similar analyses for other species in Hawai‘i and provided advice and assistance to Anden Consulting and IEc on this report.

EXECUTIVE SUMMARY

1. INTRODUCTION

The purpose of this report is to identify and analyze the potential economic impacts that would result from the proposed critical habitat designation for the threatened and endangered plant species on Moloka'i. Section 4(b)(2) of the Endangered Species Act (the Act) requires the Service to designate critical habitat on the basis of the best scientific and commercial data available after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

The focus of this economic analysis is on section 7(a)(2) of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out by the Federal government is not likely to *jeopardize* the continued existence of any endangered or threatened species or result in the destruction or *adverse modification* of critical habitat. Federal agencies are required to consult with the Service whenever they propose a discretionary action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection that apply directly to lands designated as critical habitat. Because consultation under section 7 only applies to activities that involve Federal permits, funding or involvement, the designation of critical habitat will not afford any additional protections under the Act with respect to strictly private activities. This analysis does not address impacts associated with implementation of other sections of the Act.

2. PROPOSED CRITICAL HABITAT DESIGNATION

The Service is proposing seven critical habitat units—three of which are divided into six subunits, for a total of 10 units and subunits. Combined, these units cover 43,516 acres, much of which are in the remote mountainous regions and uninhabited shoreline areas of Moloka'i.[1]

3. ECONOMIC IMPACTS

For the most part, implementation of the section 7 listing and critical habitat provisions of the Act on the areas proposed for critical habitat would have modest economic impacts for the following reasons:

[1] This acreage estimate overstates the actual critical habitat acreage, because it includes "unmapped holes," including the Kalaupapa historical settlement area and other smaller man-made structures and features discussed in Chapter I, Section 2.b.

— As modified[2], none of the units contains significant military, residential, commercial, industrial or golf-course projects; crop farming; or intensive livestock operations. Furthermore, over the next 10 years, few projects are planned for locations in the proposed critical habitat. This situation reflects the facts that (1) much of the land is unsuitable for development or other economic activities due to the rugged mountainous terrain, lack of access, and remote locations; and (2) most of the land proposed for critical habitat is in the Conservation District where development and most other economic activities are severely limited.

— Some existing and continuing activities involve the operation and maintenance of existing man-made features and structures. These are not subject to the critical habitat provisions of section 7 because they do not contain the *primary constituent elements* for the plants, and therefore would not be impacted by the designation.

— Some existing and planned projects, land uses, and activities that could affect the proposed critical habitat units have no *Federal involvement* that would require section 7 consultation with the Service, so they are not restricted by the requirements of the Act.

— For the anticipated projects and activities that will have *Federal involvement,* many are conservation efforts that will not negatively impact the plants or their habitat and many have already been the subject of consultations prior to the proposed designation. As a result, they likely will be subject to informal consultation or non-substantive reinitiation.

For various economic activities in the proposed critical habitat, Table ES-1 presents estimates of (1) the total direct and indirect costs and benefits attributable to the section 7 provisions of the Act that are associated with listing the plants as threatened and endangered species *and* with designating critical habitat for the plants, and (2) that portion of the total costs and benefits which is estimated to be solely attributable to the critical habitat designation.

Over a 10-year time period, the total estimated section 7-related costs associated with the plant species listings and critical habitat designation, including the indirect cost to investigate the implications of critical habitat, are $162,070 to $967,250, while those attributable solely to the critical habitat designation are $147,720 to $853,150. These costs represent, in the worst case, about .03% of the total personal income generated in Maui County in 1999. The highest direct cost would be for section 7 consultations and possible project modifications at an existing ranching operation: $15,300 to $204,000, all of which would be attributable to critical habitat. In addition, although not subject to accurate quantification, other indirect costs could add to the totals.

[2] The Service has indicated that the final rule for the critical habitat will feature (1) remapped boundaries that exclude large areas which do not contain *primary constituent elements*, and (2) an expanded list of man-made features and structures that do not contain *primary constituent elements.* (Memorandum to the Service, Washington Office, from the Service, Honolulu Field Office, April 2002).

Designation of the proposed critical habitat and related actions taken to control threats to the plant species (e.g., ungulate control) may also generate economic benefits. These benefits may be related directly or indirectly to designation and manifest in increased regional economic activity or social welfare. For the former, to the extent that critical habitat designation leads to additional conservation management activities funded by out-of-state sources, a local increase in revenues and employment may result. For the latter, species preservation and recovery and other complementary ecological improvements may generate social welfare benefits for residents and non-residents alike. However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Moloka'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms.

Table ES-1. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 COSTS					
Management of Game Hunting					
State-Managed Lands, Consultations	$ 770	$ 12,650	$ 220	$ 5,750	Consultation due to Pittman-Robertson funding
State-Managed Lands, PMs	$ 17,600	$ 148,000	$ 13,200	$ 111,000	Based on prior PMs
National Parks					
Kalaupapa National Park, Fencing Consultations	$ 15,600	$ 15,600	$ 15,600	$ 15,600	Consultation due to National Park Service involvement
Kalaupapa National Park, Fencing PMs	Minor	Minor	Minor	Minor	PMs, if any, would be minor due to beneficial nature of project
Kalaupapa National Park, Consultation for Possible Landfill Relocation	$ 8,900	$ 19,400	$ 8,900	$ 19,400	Consultation due to National Park Service involvement
Kalaupapa National Park, Landfill PMs	Minor	Minor	Minor	Minor	PMs, if any, would be minor due to small size and early stages of project
Conservation Projects					
East Molokai Watershed Partnership, Consultations	$ 5,200	$ 65,500	$ 5,200	$ 5,200	Consultation due to likely Fed funding and Service involvement in the East Molokai Watershed Partnership
East Molokai Watershed Partnership, PMs	None	None	None	None	
Hui Malama o Moomomi, Consultations	$ 5,200	$ 10,400	$ 1,000	$ 5,700	Consultation due to possible Service funding
Hui Malama o Moomomi, PMs	None	None	None	None	
Ilio Point, Consultations	$ 5,200	$ 5,200	$ -	$ -	Consultation due to possible Service funding
Ilio Point, PMs	None	None	None	None	
Wildlife Habitat Incentives Program, Consultations	$ 5,200	$ 47,100	$ 5,200	$ 47,100	Consultation due to NRCS (DOA) funding
Wildlife Habitat Incentives Program, PMs	None	None	None	None	

Table ES-1. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 COSTS (cont'd)					
Agriculture and Ranching Operations					
Puu o Hoku Ranch, Consultations	$ 15,300	$ 25,800	$ 15,300	$ 25,800	Consultation due to Fed funding and designation of critical habitat
Puu o Hoku Ranch, PMs	$ -	$ 177,900	$ -	$ 177,900	PMs could involve canceling existing NRCS contracts
Other Ranching Operations, Consultations	$ 9,700	$ 41,200	$ 9,700	$ 41,200	Consultation due to Fed funding
EQIP or CRP funded projects, PMs	$ -	$ 100,000	$ -	$ 100,000	PMs could involve foregoing Fed funding
Real Estate Development					
Development within Agricultural District	None	None	None	None	No projects planned in CH and no Fed involvement
Enterprise Community Activities, Consultations	None	None	None	None	No projects planned in CH
Water Systems					
Molokai Irrigation System	None	None	None	None	No projects planned in CH
Molokai Ranch Water System, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures. Also no Fed involvement
Communications Facilities					
New Facilities, Consultations	$ 7,500	$ 9,100	$ 7,500	$ 9,100	Consultation due to FCC and FAA permits
New Facilities, PMs	$ -	$ 100,000	$ -	$ 100,000	Could include moving the site
Trails and Roads					
Unpaved Roads within State Forest Reserve, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures.
Unpaved Roads outside State Forest Reserve, Consultations	None	None	None	None	No consultations required since no Fed involvement
Paved Road Widening, Consultations	$ 8,900	$ 19,400	$ 8,900	$ 19,400	Consultation due to Fed funding
Paved Road Widening, PMs	None	None	None	None	No PMs anticipated because remaining in already disturbed area
Power Transmission Lines, Consultations	None	None	None	None	No projects planned and no Fed involvement
U.S. Military Activities, Consultations	None	None	None	None	No planned military activity in CH
Ecotourism, Consultations	None	None	None	None	No consultation required since no Fed involvement
Natural Disasters					
Recovery Projects, Consultations	$ 4,000	$ 7,500	$ 4,000	$ 7,500	Consultation due to FEMA funding
Recovery Projects, PMs	Minor	Minor	Minor	Minor	Few adverse impacts anticipated

Table ES-1. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
INDIRECT COSTS					
Management of Game Mammals and Loss of Hunting Lands	Minor	Minor	Minor	Minor	Slight probability of a major impact
Conservation Management	Minor	Minor	Minor	Minor	No obligation to proactively manage lands to control threats, but an undetermined probability of a major impact
Subsistence and Native Hawaiian Traditional and Cultural Practices	Minor	Minor	Minor	Minor	Undetermined, but slight, probability of a major impact
Redistricting of Land by the State	Small	Small	Small	Small	Small probability of significant impacts
State and County Development Approvals	Modest	Modest	Modest	Modest	Few anticipated projects, but costs to projects range from insignificant to substantial
Reduced Property Values	Modest	Modest	Modest	Modest	Decrease in property value expected to be small, but perceptions could contribute to more significant reduction
Condemnation of Property	None	None	None	None	No condemnation resulting from CH. Also, the Service acquires land by negotiation, not condemnation
Investigate Implications of CH	$ 53,000	$ 162,500	$ 53,000	$ 162,500	25 private landowners may investigate the implications of CH on their lands
Reduced Cooperation on Conservation Projects	Modest	Modest	Modest	Modest	Some landowners want to avoid CH designation

Table ES-1. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT BENEFITS					
Regional Economic Activity Generated by Conservation Management	Minor	Minor	Minor	Minor	Much of the benefit likely accrued elsewhere if financed with off-island sources
Regional Economic Activity Associated with Ecotourism	Minor	Minor	Minor	Minor	The Service prefers that guides do not feature visits to endangered plants
Regional Economic Activity Associated with Avoided Cost to Developers	Minor	Minor	Minor	Minor	Helps developers site projects
Social Welfare Benefits of Habitat Designation	Minor	Minor	Minor	Minor	The designation may result in preservation of open lands
INDIRECT BENEFITS					
Social Welfare Benefits of Endangered Species Preservation	ne	ne	ne	ne	Difficult to estimate preservation benefits and their value
Social Welfare Benefits of Broader Ecological Improvements	ne	ne	ne	ne	Difficult to determine environmental improvements attributable to the implementation of section 7
TOTAL					
Costs Over 10 Years	**$ 162,070**	**$ 967,250**	**$ 147,720**	**$ 853,150**	Figures exclude costs of undetermined probabilities
Benefits Over 10 Years	**ne**	**ne**	**ne**	**ne**	Difficult to estimate

THE LISTED PLANTS AND PROPOSED CRITICAL HABITAT[3] CHAPTER I

Under the Endangered Species Act of 1973, as amended (the Act), the United States Department of the Interior, Fish and Wildlife Service (the Service) proposes to designate critical habitat for threatened and endangered plant species on the island of Moloka'i in Hawai'i. This chapter provides information on the listed plants and proposed critical habitat units, most of which comes from the document "Endangered and Threatened Wildlife and Plants; Revised Determinations of Prudency and Proposed Designations of Critical Habitat for Plant Species From the Island of Moloka'i, Hawai'i; Proposed Rule" (the proposed rule) published in the *Federal Register* on April 5, 2002 (67 FR 16492). In addition, the Service provided valuable information for this chapter in the form of overlay resource maps and detailed acreage data.

1. THE LISTED PLANTS

The Service proposes critical habitat for 46 threatened and endangered plant species on Moloka'i. The proposed rule contains a detailed discussion of the plant taxa, including taxonomy, ecology, habitat requirements, historical and current distribution and threats for each of these species.

2. PROPOSED CRITICAL HABITAT UNITS

The Service is proposing seven critical habitat units on Moloka'i—three of which are divided into six subunits, for a total of 10 units and subunits (referred to throughout this report as "units"). Based on the proposed rule and other sources, this chapter and Table I-1 provide information on the units, including the *primary constituent elements* essential for the conservation of each plant species, their general location and terrain, excluded features and structures, acreages, land ownership, existing land management, and existing improvements and activities in the units. The proposed rule provides detailed information on the critical habitat boundaries and the map coordinates of boundary points.

---

[3]**Note to Reader:** After learning about the proposed critical habitat in this chapter, readers who are already familiar with Maui County (Chapter II), the Act (Chapter III), existing protections (Chapter IV), or the methodology for conducting the economic analysis (Chapter V) may wish to skip these chapters, as appropriate, and proceed to the analysis of economic impacts (Chapter VI).

2.a. ***Primary Constituent Elements***

Each of the proposed critical habitat units provides one or more of the *primary constituent elements* essential for the conservation of the plant species. The Service defines *primary constituent elements* on the basis of the habitat features of the areas where the plant species are reported. Habitat features include the type of plant community, associated native plant species, locale (e.g., steep rocky cliffs, talus slopes, stream banks), and elevation.

2.b. Excluded Areas, Features and Structures

As indicated in the proposed rule, existing man-made features and structures do not contain, and are not likely to develop, *primary constituent elements.* As a result, the Service considers these features and structures to be excluded from the proposed critical habitat as "unmapped holes." Some of the "unmapped holes" the Service has identified span a large area of the designation and can be excluded by remapping boundaries. Specifically, the portions of Units A2 and B1 on Kalaupapa Peninsula that overlap with the developed areas of Kalaupapa National Historical Park including existing residences, roads, a cemetery, former habitations of historic and cultural significance, and the Moloka'i Lighthouse, lack the *primary constituent elements* and are therefore excluded.[4]

On the other hand, some of the existing man-made features and structures are small and cannot easily be excluded by remapping boundaries. The operation and maintenance of these man-made features and structures generally would not be impacted by critical habitat designation.

In addition to such man-made features and structures listed in the proposed rule, the Service has identified additional ones that do not contain primary constituent elements. Below is the modified list of excluded man-made features and structures:

- Aqueducts and other water system features including, but not limited to, pumping stations, irrigation ditches, pipelines, siphons, tunnels, water tanks, gaging stations, intakes and wells.
- Telecommunications towers and associated structures and equipment.
- Buildings.
- Electrical power transmission lines and associated rights-of-way.
- Paved roads and trails.
- *Heiau* (indigenous places of worship or shrines).

At the bottom of Table I-1, the section entitled "Improvements/Activities" indicates which of these features are associated with each unit.

Because these man-made features and structures are excluded from the proposed designation, they are also excluded from this economic analysis. Henceforth, references to the proposed critical

[4] The Service indicates that the final rule for the critical habitat will feature remapped boundaries that exclude this larger area that lacks *primary constituent elements.*

habitat already exclude all features and structures discussed above unless indicated otherwise by footnotes.

2.c. Acreage

As shown in Table I-1, the acreage encompassed with the boundaries of the 10 proposed critical habitat units total 43,516 acres, which is about 26 percent of the island.[5]

2.d. Location and Terrain

The majority of the acreage is in uninhabited and relatively remote areas of the island:

— Units A1 and A2 are on the northwestern shore of the island, where the remote location and moderate to difficult access discourage development;

— Unit B2 is a small islet off the north coast of the island designated as a bird sanctuary;

— Units C and D contain steep sea cliffs along Moloka'i's northeastern shore and are nearly inaccessible, except by boat during calm weather and by extremely rugged hiking trails;

— Portions of Units A2 and B1 are on Kalaupapa Peninsula which cannot be reached by car. Access is by hiking trail, mule, boat or plane, and residency is restricted to former patients of Hansen's Disease and National Park Service personnel (about 150 persons according to the 2000 Census);

— The remainder of Unit B1 and much of Unit F are mountainous areas with steep gulches and valleys that limit accessibility.

Though still fairly remote, the remaining units (E1, E2, G) are closer to roads and habitation areas than the above units, and thus are more physically suitable for future development, though significant future development in these units remains unlikely. Units E1 and E2 are located on the far east end of Moloka'i, and Unit G is located on the lowland ridge stretching from Kaunakakai to Kamalo.

Detailed maps appear in the proposed rule.

[5] This acreage estimate overstates the actual critical habitat acreage because it includes "unmapped holes," including the Kalaupapa National Historical Park developed area and other smaller man-made structures and features discussed under Chapter I, Section 2.b.

2.e. *Occupied* and *Unoccupied* Areas

The Service considers about 8,229 acres (19 percent) of the proposed critical habitat to be *occupied* by the listed plant species and 35,282 acres (81 percent) to be *unoccupied*.[6] The *unoccupied* areas were included in the proposed designation because the Service believes that they are necessary to provide for the long-term survival and conservation of the species.

2.f. Land Ownership

Approximately half the area (21,487 acres or 49 percent) proposed as critical habitat is owned by the State. Most of the remaining area proposed as critical habitat is owned by major private landowners (20,891 acres or 48 percent), defined as owners of at least 500 acres in Hawai'i. Minor private landowners own 1,070 acres (two percent), while the Federal government and the County of Maui together own less than one percent (22 acres and seven acres, respectively).[7]

2.g. Existing Land Management

Land in the proposed critical habitat is subject to a variety of existing regulations and land-management programs that already limit activities in those areas. These include: Federal programs, State land-use controls and programs, county land-use controls, and land management by various public and private organizations. The regulations and land-management programs are described in Chapter IV.

Table I-1 at the end of this chapter identifies, by critical habitat unit, the amount of acreage under each type of control or management. Since some of the managed areas overlap with one another (e.g. portions of State Hunting Units are in State Forest Reserves), the percentages in Table I-1 do not always sum to 100 percent.

As indicated in the table, approximately 5,664 acres (13 percent) of the proposed critical habitat are managed by the Federal government as part of the Kalaupapa National Historical Park.

Approximately 66 percent of the acreage proposed for critical habitat is in the State Conservation District[8]—5,845 acres are in the Protective Subzone, 1,105 acres are in the Limited Subzone, 20,936 are in the Resource Subzone, and 750 acres are in the General Subzone. In general, development and commercial activity is limited in the Conservation District with varying levels of restrictions based on the applicable Subzone (see Chapter IV for a full discussion).

---

[6] This acreage estimate overstates the actual critical habitat acreage because it includes "unmapped holes", including the Kalaupapa National Historical Park developed area and other smaller man-made structures and features discussed under Chapter I, Section 2.b.

[7] The acreage totals differ from the proposed rule because of recalculations made by the Service after publication of the proposed rule. The Service intends to make corrections before publication of the final rule.

[8] The acreage totals differ from the proposed rule because of recalculations made by the Service after publication of the proposed rule. The Service intends to make corrections before publication of the final rule.

In addition to the State restrictions that are placed on land in the Conservation District, some of the land proposed for critical habitat is directly managed by the State as follows: approximately 10,882 acres (25 percent of the proposed designation) are in State Forest Reserves that were established to protect native ecosystems and important watersheds, and approximately 2,938 acres (seven percent) are in Natural Area Reserves (NARs) that were established to preserve and protect representative samples of Hawai'i's biological ecosystems and geological formations. About 33 percent of the acreage proposed for critical habitat is State Hunting Units, large areas managed by the State for public hunting (see Chapter IV for full discussion of State Forest Reserves, NARs, and State Hunting Units).[9]

While the State manages land in the Conservation District, the County of Maui has primary responsibility for land in the other Districts – namely, the Agricultural, Urban and Rural District. These three Districts are subject to county land-use and development controls, including county community plans, zoning, and building code regulations affecting farm, residential, commercial, and industrial development and use. Of the proposed critical habitat designation, approximately 14,786 acres are in the Agricultural District (34 percent) and approximately 178 acres (less than one percent) are in the Urban District.[10] In Special Management Areas (SMAs) located along the shoreline, the county has an additional layer of regulation that provides special control on development, even for land already subject to Conservation District restrictions (see Chapter IV for full discussion).

Approximately 3,457 acres proposed for critical habitat (8 percent) are privately managed under a cooperative agreement as part of the East Moloka'i Watershed Partnership. Another 21 acres (less than one percent) are within Mo'omomi, Pelekunu, or Kamakou Preserves, privately managed by the Nature Conservancy under the Natural Area Partnership program (see Chapter IV for full discussion.

[9] Because some of these areas have more than one management designation, the percentages do not sum to 100 percent. For example, portions of State Hunting Units also may be designated as State Forest Reserves.

[10] The acreage totals differ from the proposed rule because of recalculations made by the Service after publication of the proposed rule. The Service intends to make corrections before publication of the final rule.

Table I-1. Critical Habitat Units, Moloka`i Plants: Acreage, Location, Ownership, Land Management, Improvements and Activities

Item	Units	All Units		Moloka'i Unit A1	Moloka'i Unit A2	Moloka'i Unit B1	Moloka'i Unit B2	Moloka'i Unit C	Moloka'i Unit D	Moloka'i Unit E1	Moloka'i Unit E2	Moloka'i Unit F	Moloka'i Unit G
		Total	Share										
Total Area*	Acres	43,516		1,171	3,793	5,389	10	11,144	1,155	315	821	12,247	7,471
Area Occupied by Listed Plants	Acres	8,229	19%	271	613	769	10	1,039	393	-	-	4,397	737
Land Ownership													
Federal	Acres	22	<1%	-	20	2	-	-	-	-	-	-	-
State	Acres	21,487	49%	217	3,274	4,914	10	6,279	-	-	-	4,224	2,569
County	Acres	7	<1%	-	-	-	-	-	-	-	-	6	1
Private, Major Owner	Acres	20,891	48%	950	492	468	-	4,400	1,153	304	774	7,813	4,538
Private, Small Owners	Acres	1,070	2%	-	-	-	-	458	-	8	36	205	362
State/County Roads	Acres	14	<1%	-	-	-	-	-	-	2	11	-	-
Federally Controlled or Managed													
National Historical Park	Acres	5,664	13%	-	1,886	3,680	-	-	-	-	-	98	-
Military	Acres	0	0%	-	-	-	-	-	-	-	-	-	-
FWS, non-plant populations	Present			-	Present	Present	-	Present	Present	-	-	Present	Present
State-Controlled or Managed													
Conservation District	Acres	28,552	66%	415	1,091	4,442	10	11,144	1,155	214	5	10,076	-
Protective Subzone	Acres	5,845	13%	-	-	1,300	10	2,483	-	-	-	2,053	-
Limited Subzone	Acres	1,015	2%	222	573	214	-	-	-	-	5	-	-
Resource Subzone	Acres	20,936	48%	-	158	2,725	-	8,661	1,155	214	-	8,023	-
General Subzone	Acres	750	2%	193	355	203	-	-	-	-	-	-	-
Special Subzone	Acres	0	0%	-	-	-	-	-	-	-	-	-	-
Forest Reserves	Acres	10,882	25%	-	8	431	-	4,614	-	-	-	5,828	-
Natural Area Reserves	Acres	2,938	7%	-	-	1,269	-	1,669	-	-	-	-	-
State Plant Sanctuary	Acres	17	<1%	-	-	-	-	-	-	-	-	-	17
State Bird Sanctuary	Acres	10	<1%	-	-	-	10	-	-	-	-	-	-
State Hunting Units	Acres	14,348	33%	-	20	3,400	-	5,100	-	-	-	5,828	-
County-Controlled or Managed													
Agricultural District	Acres	14,786	34%	757	2,524	947	-	-	-	101	816	2,171	7,471
Urban	Acres	178	<1%	-	178	-	-	-	-	-	-	-	-
Special Management Areas	Acres			Shoreline	Shoreline	Shoreline	Shoreline	Shoreline	-	-	-	-	-

Table I-1. Critical Habitat Units, Moloka`i Plants: Acreage, Location, Ownership, Land Management, Improvements and Activities

Item	Units	All Units		Moloka'i Unit A1	Moloka'i Unit A2	Moloka'i Unit B1	Moloka'i Unit B2	Moloka'i Unit C	Moloka'i Unit D	Moloka'i Unit E1	Moloka'i Unit E2	Moloka'i Unit F	Moloka'i Unit G
		Total	Share										
Private-Controlled or Managed													
Watershed Partnership	Acres	3,457	8%	-	-	-	-	5	-	-	-	2,126	1,325
TNCH Preserves	Acres	21	<1%	-	0	8	-	11	-	-	-	1	-
Improvements/Activities													
Paved Roads**	Present	-		-	Present	Present	-	-	-	Present	Present	-	-
Unpaved Rds or 4-wd Trails**	Present	-		Present	Present	Present	-	-	Present	-	Present	Present	Present
Hiking Trails**	Present	-		Present	Present	Present	-	Present	-	-	-	Present	Present
Recreational Buildings**	Count	3		-	1	1	-	-	-	-	-	1	-
Communication Complexes**	Count	2		1	1	-	-	-	-	-	-	-	-
Navigational Lighthouse**	Count	1		-	1	-	-	-	-	-	-	-	-
Water Improvements**	Count	22		-	3	8	-	-	-	-	1	7	3
Power Transmission Lines**	Count	4		-	1	-	-	-	-	1	1	1	-
Residential Area**	Count	1		-	1	-	-	-	-	-	-	-	-
Heiau**	Count	3		-	1	-	-	-	1	-	-	-	1
Other Structures**	Count	8		-	-	4	-	-	-	-	-	4	-
Military	Count	-		-	-	-	-	-	-	-	-	-	-
Hunting, State-Managed Units	Count	8		-	1	2	-	1	-	-	-	4	-
Grazing	Present	-		Present	Present	-	-	-	-	Present	Present	Present	Present

Note: Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

* This acreage estimate overstates the actual critical habitat acreage because it includes "unmapped holes," including existing development at Kalaupapa National Historical Park and the existing structures discussed in Chapter I, Section 2.b.

** Manmade features within critical habitat units, but excluded from critical habitat.

PHYSICAL AND SOCIOECONOMIC PROFILE OF MAUI COUNTY[11] CHAPTER II

To provide context for evaluating the economic impacts of the proposed critical habitat designation, this chapter presents (1) physical descriptions of the main islands of Maui County (Maui, Moloka'i, Lana'i and Kaho'olawe); and (2) socioeconomic profiles of Maui County and each of the main islands. A summary of the socioeconomic data is presented in Table II-1.

1. PHYSICAL DESCRIPTIONS OF THE ISLANDS OF MAUI COUNTY

The four main islands and smaller islets of Maui County are situated in the middle of the main portion of the Hawaiian chain. O'ahu lies to the northwest and the Big Island of Hawai'i lies to the southeast. Less than a million years ago, the four islands of Maui County were physically connected—that once-single island is sometimes referred to today as "Maui Nui."

1.a. Island of Moloka'i

Moloka'i is the fifth largest of the main Hawaiian islands at 38 miles long, up to 17 miles wide, and 266 square miles in area. It was formed from the coalescence of two large shield volcanoes and one much smaller volcano.

West Moloka'i, the older of the two large volcanoes (at 1.9 million years), is very flat, rising to only 1,381 feet with an east-west extent of about 12 miles. This elevation is insufficient to check the blustery trade winds or induce orographic rainfall. As a result, windy and dry (15 to 40 inches rainfall per year) conditions prevail, and coastal and inland sand dunes extend almost completely across the northwestern corner of West Moloka'i. In this area, cattle and goats were introduced beginning in the 1800s. Subsequently, these ungulates overgrazed a former forest, resulting in severe erosion.

East Moloka'i is a slightly younger volcano (1.8 million years) and much larger. It measures 27 miles east to west and eight miles north to south. The eroded East Moloka'i Mountains comprise about two-thirds of the east-west extent of the island. They are dominated on the north coast by precipitous sea cliffs rising more than 3,600 feet—the tallest sea cliffs in the world. Also, three amphitheater-headed valleys open to the windward (north) coast, their ridges converging on the island's summit at Kamakou (4,970 feet). Rainfall on the windward side varies from 75 inches to

[11] **Note to Reader:** Readers who are already familiar with Maui County may wish to skip this chapter and proceed to the next background-information chapters (Chapters III through V), or to the economic analysis (Chapter VI).

more than 160 inches per year. The gulch-scored leeward slopes of East Moloka‘i descend to a narrow coastal plain on the south side of the island. Certain areas in the East Moloka‘i Mountains are accessible via four-wheel-drive vehicle. Foot trails provide access to portions of the mountainous interior, but many areas have difficult access.

Between these two volcanoes lies the Moloka‘i isthmus, commonly referred to as the Ho‘olehua Plain. This area was formed when lava flowing from the East Moloka‘i volcano overlapped the West Moloka‘i shield.

The third distinctive volcano forms the four-square-mile Kalaupapa Peninsula on the north central coast. Windward cliffs 1,600 feet high and negotiable only on foot or by mule separate Kalaupapa from the rest of the island. Kalaupapa Peninsula receives 40 to 50 inches of rain a year.

1.b. Island of Maui

Maui, the second largest of the eight major islands, is 48 miles long, 26 miles wide, and 728 square miles in area. It was formed from the remnants of two large shield volcanos connected by an isthmus that drops to an elevation of less than 130 feet in the middle of the saddle.

The older West Maui Mountains (at 1.3 million years) are heavily eroded by streams that have cut deep valleys and ridges into the original volcano and have limited access to many of the interior regions. The highest point on West Maui is Pu‘u Kukui at 5,788 feet, where the average rainfall is 400 inches per year. This is the second wettest spot in Hawai‘i. Typical of older and eroded areas, West Maui hosts highly diverse regional flora.

Dominating East Maui is the 10,023-foot massive volcano Haleakala (“House of the Sun”). Haleakala retains its classic shield shape due to its comparative geological youth (750,000 years). It is considered to be an active volcano, although the last summit eruption occurred 800 to 1,500 years ago, and the last flank eruption occurred in about 1790. Average annual rainfall on Haleakala exceeds 300 inches a year on the windward (northeast) side of the mountain at about the 2,000- to 3,000-foot elevation; about 35 inches at the summit; and less than 30 inches on the dry leeward (south) side. Summit rainfall is low because the trade wind inversion (at about the 7,000-foot elevation) impedes the moisture-laden trade winds from reaching higher elevations. The sizable summit crater (7.5 miles long and 2.5 miles wide) is a dry cinder desert. Haleakala does not exhibit the diverse vegetation of the older West Maui Mountains.

1.c Island of Lana‘i

Lana‘i, the smallest of the inhabited main Hawaiian islands, is 13 miles long, 13.3 miles wide, and 139 miles square. It was formed from a single dome-shaped shield volcano that last erupted 1.3 million years ago and now has a maximum elevation of 3,370 feet at its summit, Lana‘ihale.

Lana‘i is sheltered from the wind by the much larger island of Maui, putting it in a rain-shadow during trade-wind weather. Rainfall on Lana‘i is uncharacteristically low for Hawai‘i, ranging from just 35 inches annually near Lana‘ihale to less than 10 inches in the southwestern part of the island. Lana‘i has no perennial streams or lakes, and the sustainable groundwater yield is estimated at just six million gallons per day.

Because the northeastern (windward) coast of the island is sheltered from ocean forces and wave erosion, it is fringed with broad expanses of sandy beaches and sediment, with no appreciable sea cliffs. On the other hand, the southwest (leeward) coast is exposed to wave erosion from southwesterly storms, resulting in high sea cliffs. On the southeastern coast, strong winds have blown beach sand to form a 10- to 20-foot ridge of dunes.

1.d. Island of Kaho‘olawe

Kaho‘olawe lies 6.7 miles off the south coast of Maui. It is the smallest of the eight main islands, measuring 10.9 miles long, 6.4 miles wide, 45 square miles in area, and 1,477 feet at its highest point. Formed from the summit of a single volcanic dome, it is one of the older islands in the Hawaiian group. Also, it is arid, having the lowest rainfall of all the main islands. This is due to the combination of its low relief and its position in the lee of towering Haleakala. Annual rainfall averages about 25 inches on its eastern slopes, while the southwestern side of the island receives considerably less rain. By the early 1900s and continuing into the 1990s, overgrazing by goats reduced vegetation, and strong trade winds blew away vast quantities of soil. The landscape suffered further degradation during the approximately 50 years that the military used the island as a target for naval and aerial bombardment training, discussed below.

2. SOCIOECONOMIC PROFILE OF MAUI COUNTY

Table II-l summarizes economic and demographic information about the County of Maui, including the islands of Maui (four districts), Moloka‘i (two districts), Lana‘i and Kaho‘olawe (one district each). For statistical purposes, Kalawao County (the former colony on Moloka‘i for quarantined Hansen’s disease patients) is treated as a district of Maui County.

Many of the descriptive economic statistics for Maui County are available only at the aggregated County level; that is, they are not available for each individual island. Nonetheless, wherever possible, data for individual islands are used. Reflecting the data availability, the discussion below first presents information for Maui County, with an emphasis on describing quantitative indicators. Discussions of the individual islands that make up the County follow, with quantitative information provided as available. Estimates and figures presented in this section are taken from the State Data Book as well as the Maui County Data Book 2001, as are the estimates in Table II-1.

2.a. Maui County

2.a.(1) Population and Distribution

In the year 2000, the County of Maui had a population of 128,241residents, up 27.6 percent since the 1990 U.S. census. The total Maui County population amounted to 10.6 percent ofthe State population, the third largest of the four counties (after O‘ahu).

Based on year 2000 estimates, the island of Maui hosts the greatest population by far of the four County islands, supporting about 91.7 percent of Maui County residents. A much smaller fraction of the County’s population lives on Moloka‘i (5.8 percent) and Lana‘i (2.5 percent). Kaho‘olawe has no permanent residents.

2.a.(2) Primary Economic Activities

The economy of Maui County is dominated by a large visitor industry located mostly on the island of Maui. It also features a large but shrinking agriculture industry and a budding high-technology industry, also on the island of Maui.

Tourism

Tourism overwhelmingly dominates the economy of the County (personal communication with Maui Chamber of Commerce, April 2002). The County hosted over 2.3 million visitors in the year 2000, resulting in an average of 43,854 visitors present on the islands (the average visitor census).

From 1990 to 2000, the average visitor census increased 11 percent. While the annual number of visitors to Maui County actually declined 3.6 percent during that time, the visitor census nonetheless rose due to an increase in the average length of stay. Of the visitors present, approximately 95.4 percent were on the island of Maui, 2.1 percent on Moloka‘i, and 2.6 percent on Lana‘i. Also, approximately 86 percent were Americans and most of the remainder were Japanese and Canadians.

From 1990 to 2000, visitor expenditures increased significantly, by approximately 39.5 percent. This increase was greater than the 27.7-percent increase in inflation as measured by the Consumer Price Index (CPI).

Further detail on the visitor industry on each island is provided in the island-specific discussions, below.

Agriculture

Agriculture, while the second-largest industry in the County, is much smaller than tourism. Specifically, in 2000, agricultural sales in the County totaled approximately $118 million, or only four percent of visitor expenditures.

In addition, Maui County’s agriculture industry is becoming smaller in size. During the 1990s, agricultural sales declined 22.1 percent, due largely to contraction in plantation agriculture and increased competition from farmers on O‘ahu.

Agricultural activities include sugar and pineapple plantations on the island of Maui, and diversified crops and ranching located mostly on the islands of Maui and Moloka‘i. Further details on island-specific agriculture are discussed in the subsection for each island.

High-Technology Activities

As mentioned above, the island of Maui has a budding high-tech industry, although income figures for the industry have not been aggregated. Information on the specific activities is discussed in the subsection on Maui Island.

2.a.(3) Labor Force and Employment

In 2000, the County's civilian labor force numbered about 72,400 workers, up 28.1 percent since 1990. Employment reached 69,350 workers, up 28.9 percent since 1990 and resulting in a relatively low unemployment rate of 4.2 percent. The number of wage and salary jobs for Maui County increased 22.6 percent (versus 28.9 percent for all jobs), indicating a large increase in the number of self-employed workers and farmers.

As suggested by the discussion of primary economic activities above, most of the County's wage and salary jobs are concentrated in non-farming and non-manufacturing sectors. The primary employers are: (1) transportation, communications, and utilities; (2) trade (retail and wholesale); (3) services (hotel, tourism, and health); and (4) government. The number of wage and salary jobs rose in all these categories from 1990 to 2000. On the other hand, wage and salary jobs declined in the following sectors: (1) construction and mining; (2) manufacturing; (3) finance, insurance and real estate; and (4) agriculture (the declines would be less dramatic if self-employed workers and farmers were counted).

Employment estimates vary considerably from island to island within the County; more information is provided in the island-specific discussions below.

2.a.(4) Personal Income

Reflecting the growth in the tourism sector, the County's total personal income and per-capita income started out the decade in 1990 at $2 billion and $19,782, respectively, and finished the decade in 1999 at nearly $3 billion and $24,312, respectively. This represents a significant increase in overall income of 47.6 percent, and a more modest increase in per-capita income of 22.9 percent. While beneficial, this modest increase in per-capita income failed to keep pace with inflation as measured by the 25.5-percent increase in the CPI during the same 1990-to-1999 period. More information on personal income is provided in the island-specific discussions, below.

2.b. Island of Moloka'i

2.b.(1) Population and Distribution

In the year 2000, the island of Moloka'i had 7,404 residents, approximately 5.8 percent of the County's total population. The island's population has grown 10.2 percent since the 1990 U.S. census, a significantly smaller growth rate than those for Lana'i and Maui Island for the same period.

In the most recent census, only two towns had populations greater than 1,000 residents: Kaunakakai on the south coast (2,726); and Kualapu'u in central Moloka'i on Hawaiian Homestead Lands near the airport (1,936). The third largest community and a former plantation town, Maunaloa Town in West Moloka'i, had a population of 230. On the north side of the island, Kalaupapa had 147 residents. The remainder of Moloka'i's population lives in scattered communities along the narrow coastal plain on the south side of East Moloka'i, and in a small community near the now-closed Kaluakoi Hotel and Golf Club at the west end of the island.

There are no communities in the mountainous interior of East Moloka'i or on its flanks; no communities on the mountain that forms West Moloka'i or its flanks, with the exception of Maunaloa; no communities on the north shore other than Kalaupapa and a small community at the

east end of the island; no communities along the west shore except for the former resort area; and no communities along the south shore of West Moloka‘i.

2.b.(2) Primary Economic Activities

Moloka‘i has a small rural economy that is based largely on tourism, agriculture, ranching, and limited aquaculture.

Tourism

Moloka‘i hosted 64,560 visitors in the year 2000, resulting in an average visitor census of 904 visitors. Attractions include excursions to Kalaupapa, golf and ecotourism. However, even with the robust economic growth in California and other western states during the 1990s, Moloka‘i’s tourism industry has not expanded, primarily because it has not competed well with the other Hawaiian islands which have more attractions and offer direct mainland flights. Unlike Maui Island and Lana‘i, both Moloka‘i’s annual number of visitors and average visitor census declined, down 37.7 percent and 17.8 percent, respectively, from 1990 to 2000. The drop in visitor count was due largely to the fact that some hotels closed during the 1990s, resulting in a 23.3-percent decrease in the number of visitor units from 559 in 1990 to 429 in 2000. In addition, occupancy rates suffered for the remaining units; the average occupancy rate for the 429 visitor units on Moloka‘i was only 42.7 percent in the year 2000. Most recently, in January 2001, the island’s largest hotel—the 138-room Kaluakoi Hotel and Golf Club—closed operations.

Despite the decline in number of visitors to Moloka‘i, tourism remains one of the primary industries in Moloka‘i. The Moloka‘i Visitors Bureau is currently working with the Maui Visitors Bureau to attract more visitors to the island (personal communication with Maui Chamber of Commerce, April 2002).

Agriculture, Ranching and Aquaculture

Agriculture is the other primary industry in Moloka‘i. Similar to Maui Island, agriculture remains a part of Moloka‘i’s economy but has changed in its characteristics over time. For the greater part of a century, pineapple was the island’s chief industry. Plantations were located in West Moloka‘i on the Ho‘olehua Plain and on the western end near Maunaloa. However, the plantations closed by the early 1980s. A portion of the former plantation fields and other suitable agricultural lands have been planted in other crops, including watermelons, seed corn and other seed crops, coffee, bananas, papaya, vegetables, flowers and nursery products, and grass grown for hay. Also, *taro* continues to be grown in Halawa Valley on the east end of the island. Finally, agricultural lands not planted in crops are used mostly for grazing cattle.

However, the future growth of agriculture on Moloka‘i has been adversely affected by new competition from O‘ahu, where the closure of sugar plantations in the mid-1990s resulted in the release of good farm land for diversified crops. Farmers on O‘ahu have a competitive advantage because they are close to the large Honolulu market and, for export, Honolulu Harbor and the Honolulu International Airport. Competing farmers on Moloka‘i must absorb shipping cost to O‘ahu to supply these markets. As a result, agriculture is not expected to grow significantly.

In addition to diversified crops, aquaculture is being pursued on the sunny south shore of West Moloka‘i and in a few of the old Hawaiian fishponds on the south shore of East Moloka‘i. Fish, shrimp and *limu* (seaweed) are harvested for local sale and for export to O‘ahu.

2.b.(3) Outlook for Growth and Socioeconomic Change

In 2000, the unemployment rate was 14 percent, the highest in the major islands of the State. This high unemployment rate reflects the growing labor force combined with contraction in the visitor industry and slow or negative growth in other economic sectors. A number of residents engage in subsistence activity, including farming, hunting and fishing.

However, Moloka'i has been experiencing some improvement in its economy through the rural Empowerment Zone/Enterprise Communities (EZ/EC) program. This program is administered by USDA's Office of Community Development. The program promotes self-sustaining, long-term economic and community development in areas of poverty, unemployment and general distress. The program works by helping communities develop and implement comprehensive strategic plans which are supported by partnerships among private, public and non-profit entities.

Moloka'i was selected as an Enterprise Community in 1999, and began receiving federal funding from USDA. Project leaders work to leverage these federal funds with a broad array of partners, including Federal, State and local government, non-profit organizations, area businesses, public schools, and the University of Hawai'i. Currently, the Moloka'i Enterprise Community has attracted a total of 42 partners, with a leveraging ratio of 24:1 (i.e., since January 1999, $24 has been raised for every dollar from the EZ/EC grant). Partners may also provide technical support, project leadership and/or in-kind services.

With the implementation of its 10-year strategic plan, Moloka'i seeks to achieve economic growth and community development through environmental protection, the promotion of diversified agriculture, encouragement of tourism, and the addition of new community facilities. Results from the Enterprise Community designation are already noticeable. Since its designation, the Moloka'i EC has contributed to the rapid decline in unemployment rate by creating a total of 88 new full-time jobs, with more than 80 percent of these jobs being sustainable positions (Moloka'i Enterprise Community Annual Report, 2002).

In summary, although Moloka'i is still experiencing slow economic and population growth, various efforts, including the EZ/EC program and cooperation between the Moloka'i Visitors Bureau and the Maui Visitors Bureau, may help revitalize the island's economy in the future.

2.c. Island of Maui

2.c.(1) Population and Distribution

In the year 2000, the island of Maui had 117,644 residents. The population increased 28.2 percent since the 1990 U.S. census, a significantly greater increase than Moloka'i and marginally less than Lana'i. As noted above, the island hosts approximately 91.7 percent of the total County population. In 2000, Maui Island's population was geographically distributed as follows (presented in order of most- to least-populated):

— Wailuku District (Central Maui): 52.1 percent

Wailuku and Kahului, which abut one another at the northern end of the isthmus, serve as the commercial and industrial center of Maui Island. They also contain the County seat, the main airport, and Maui's main harbor. Most Wailuku

District residents live in towns along the northern end of the isthmus and, to a lesser extent, along the southern end of the isthmus. The Wailuku District also hosts a large number of visitors, particularly in resorts along the south shore of the isthmus.

— Makawao District: 31 percent

Most Makawao District residents live in towns located "Upcountry" on the western slopes of Haleakala between the 1,000- and 4,000-foot elevations. To a lesser extent, they live in a few small towns near the shoreline at the northern and southern ends of the district. This district also hosts a large number of visitors, particularly in resorts along the south shore.

— Lahaina District (West Maui): 15.3 percent

Most residents of the Lahaina District live in towns located along the shoreline at the western end of the island. This district also hosts a large number of visitors in the West Maui resorts.

— Hana District: 1.6 percent

Most residents of the Hana District live in the town of Hana and in small communities scattered along the northern and eastern ends of Haleakala.

There are no large communities in the mountainous interior of West Maui, or along portions of the north and south shores of West Maui. Also, there are no large communities along the north, east and south flanks of Haleakala, or along the north and south shores of Haleakala. A variety of factors contribute to the lack of development in these areas, including steep slopes, difficult access, the need for watershed protection, local community preferences regarding development, and others.

2.c.(2) Primary Economic Activities

The island of Maui has a strong economy that is driven by a large and growing visitor industry, a large but shrinking agriculture industry, and a budding high-technology industry.

Tourism

Tourism is Maui Island's primary business (personal communication with Maui Chamber of Commerce, April 2002). Maui Island hosted over 2.2 million visitors in the year 2000, resulting in an average of 41,819 visitors present on the island. Reflecting trends at the County level, from 1990 to 2000 the annual number of visitors to Maui Island declined 4.2 percent, but the average visitor census increased 9.6 percent due to longer stays.

Most of the resorts are located at the western end of the island, along the south shore of Central Maui, and along the southwestern shore of Haleakala.

Maui Island's visitor industry is healthy, as exhibited by strong occupancy and room rates. Contributing factors include: (1) the robust economic growth in California and other western states; (2) a new generation of commercial aircraft that can depart from the short runway on Maui with sufficient fuel to fly to the U.S. mainland; and (3) a variety of natural and developed attractions.

Like tourism across all the Hawaiian islands, Maui Island's tourism level declined following the terrorist attacks of September 11, 2001, but has since begun to recover.

Agriculture

The economic significance of agriculture on Maui Island is small compared to tourism (personal communication with Maui Chamber of Commerce, April 2002). This represents a significant contrast to most of the 1900s, however, when sugar and pineapple were the economic mainstays of Maui Island, with plantations located in Central Maui and West Maui. Currently, only two plantations remain: a large sugarcane plantation which is the dominant user of land in Central Maui, and a large pineapple plantation whose fields are split between Central Maui and West Maui. In 1999, a small sugarcane plantation in West Maui closed, thereby freeing land for other uses.

As plantation agriculture has declined, other types of agricultural activities have, to some extent, replaced it. Some of the fields in Central Maui and West Maui have been replanted in diversified crops (i.e., all crops other than sugarcane or pineapple). Also, some Upcountry Maui farmers take advantage of the cooler temperatures to grow specialized crops. Diversified crops on Maui Island include: macadamia nuts, coffee, papaya and other fruits, seed corn, flowers and nursery products, and vegetables. Finally, most of the agricultural land that is unsuitable for growing crops is used for grazing.

While the economic significance of agriculture on Maui is now small compared to tourism, it remains the island's dominant user of land and water.

High-Technology Activities

Maui has a growing high-technology industry that was forged largely on two separate complexes.[12] One is a grouping of five observatories near the summit of Haleakala. The observatories specialize in studies of the sun, galactic and quasar research, lunar and satellite ranging, and space surveillance.

The second high-technology complex is comprised of companies and operations at the Maui Research & Technology Park. The most prominent tenant is the Maui High Performance Computing Center, a national supercomputing center. Many of the companies in the Research & Technology Park take advantage of the Center's supercomputer, including some that support observatory operations.

2.c.(3) Outlook for Growth and Socioeconomic Change

The primary driving forces for Maui Island's economy will continue to be tourism and, to a much lesser extent, high-technology activities and diversified agriculture. However, limiting factors will be traffic congestion and possibly limited water in some parts of the island.

Most of the growth on Maui Island will continue to be on the west end of the island, on the southern shore of the isthmus, in the towns of Wailuku and Kahului, and in Upcountry Maui. Due to a variety of factors, including steep slopes, difficult access, the need for watershed protection, local community preferences regarding development, and others, little or no growth is anticipated

[12] Specific data on the size of this industry are not available.

in the following areas: (1) in the mountainous interior of West Maui; (2) along portions of the north and south shores of West Maui; (3) along the north, east and south flanks of Haleakala; and (4) along the north and south shores of Haleakala.

2.d. Island of Lana'i

2.d.(1) Population and Distribution

In the year 2000, Lana'i had an estimated population of 3,193 residents, up 31.6 percent since the 1990 U.S. census. Lana'i had the highest growth rate of all of the Maui County islands, which in part reflects its relatively smaller population. Nearly all residents live in the island's only residential community, Lana'i City, near the center of the island. However, two upscale residential communities are being developed near the island's two major resorts—one at Koele near Lana'i City and one at Manele Bay to the south.

2.d.(2) Primary Economic Activities

As explained below, an abrupt shift in the island's economic base occurred in the early 1990s. The opening of two luxury resorts, coupled with the closure of a large pineapple plantation, shifted the economy from one dominated by plantation agriculture to one dominated by tourism and resort-residential development.

Tourism

Lana'i's economy is dominated by tourism (personal communication with Maui Chamber of Commerce, April 2002). In the year 2000, Lana'i hosted 87,662 visitors, resulting in an average visitor census of 1,131, almost a third as large as the resident population.

From 1990 to 2000, the small tourism industry on Lana'i expanded significantly. The annual number of visitors to Lana'i increased by a startling 90.9 percent, and the average visitor census increased by a remarkable 352.3 percent. These increases were due almost entirely to two new resorts. In 1990 and 1991, Castle & Cooke opened the two world-class resorts—one at Koele (102 rooms) just northeast of Lana'i City, and the other a few miles away at Manele Bay (250 rooms) on the south shore. Taking into account an old eleven-room hotel and other visitor accommodations, there are a total of 368 visitors units on Lana'i (Visitor Plant Inventory, 2000). In addition, Castle & Cooke has the major entitlements for a second 150-room hotel at Manele Bay.

Visitor attractions include golf, ocean activities (diving, snorkeling, sailing, fishing, whale-watching, kayaking), horseback riding, hiking, mountain biking, exploring by four-wheel-drive vehicle, and hunting (axis deer, Mouflon sheep, and game birds).

Resort/Residential Community Development

A related industry involves development of luxury condominiums and custom homes as part of the resort development at Koele and Manele Bay. A total of 827 resort-residential single-family homes have been approved, of which eight were built by the end of 2001. A total of 332 multi-family units have been approved, and 61 were built by the end of 2001. At Koele, the condominium prices range in price from $600,000 to $850,000, while house lots range from $325,000 to $525,000. At Manele Bay, the condominiums range from $995,000 to $2.2 million, and house lots range from $850,000 to $15 million.

Nearly all of the purchases are for retirement homes or second homes. Expenditures on goods and services by the permanent and temporary residents, including expenditures on upkeep of their homes, will contribute to Lana'i's economy in a fashion similar to tourism.

Agriculture

In contrast to tourism and home development, agriculture comprises a very small fraction of Lana'i's economy (personal communication with Maui Chamber of Commerce, April 2002). The minor role of agriculture in Lana'i's economy represents the end of a decline in that industry that began in the early 1990s. Specifically, from the early 1920s to the early 1990s, Dole Food Company, Inc. (Dole), which came under the control of Castle & Cooke in the early 1930s, owned 98 percent of the island and operated the largest single pineapple plantation in the world—16,000 acres. The pineapple was barged to O'ahu where it was canned then shipped to the U.S. mainland and overseas markets. Pineapple was well-suited for the island because it requires little water which is limited on Lana'i. By the 1980s, however, the market for pineapple grown for canning was faltering in Hawai'i and, in 1993, Lana'i's Dole plantation was phased out.

Since the plantation closed, only about 100 acres remain in pineapple. It is sold to residents and the Lana'i hotels. Other diversified crops include small volumes of hay, macadamia nuts, papayas, bananas, vegetables, and herbs. Some of these diversified crops are purchased by the two resorts, particularly the herbs. Livestock include penned cattle and pigs.

Outside the plateau where pineapple was grown, most of the land designated for agriculture is unsuitable for farming. This reflects the fact that Hawai'i's Agricultural District is a catch-all category that includes all land not otherwise categorized, regardless of the agricultural quality of the land.

2.d.(3) Outlook for Growth and Socioeconomic Change

Lana'i has one of the lowest unemployment rates in the state: 3.5 percent in 2000. For the foreseeable future, economic and population growth on Lana'i is likely to be driven by (1) an expansion of tourism in terms of higher occupancy rates and increased visitor expenditures, and a new 150-room hotel; and (2) development of resort-residential homes for wealthy retirees and owners of second homes. This will continue Lana'i's transition from the rural, plantation-based economy that dominated the 20th century to a more upscale service economy in the 21st century.

Over the next 10 years and beyond, no new hotels and no resort-residential development are anticipated beyond the current plans mentioned above. This assessment reflects current plans for the island as well as limits imposed by the available water supply.

2.e. Island of Kaho'olawe

2.e.(1) Population

Other than short-term workers and visitors, Kaho'olawe has no permanent resident population. In fact, no communities have existed on Kaho'olawe since before the 1940s.

2.e.(2) Activities on Kaho‘olawe

The U.S. military assumed control of Kaho‘olawe at the beginning of World War II (1941) and, for the next 49 years (through 1990), used the island for amphibious landing exercises; as a target for naval and aerial bombardment training; and for other training involving the live-firing of weapons. Before 1941, Kaho‘olawe was used for ranching.

In 1994, the island was conveyed to the State and placed under the control of Native Hawaiians via the Kaho‘olawe Island Reserve Commission (see Chapter IV). That same year Congress authorized $400 million for a 10-year program to clear the island of unexploded surface ordnance, and restore its cultural and natural resources. With funding from the U.S. Navy, a private contractor is clearing the island with the goal of making major portions of it safe for human access. The Navy estimates that 69 percent of the surface but less than 10 percent of the subsurface will be cleared by the end of the 10-year period.

Selected areas will be cleared for specific uses including revegetation with native species, trails and roads, cultural sites, camping areas, and educational facilities. An education and cultural center is planned, and a rock quarry is being developed that will be used to improve the existing eight-mile road from the shoreline base camp at Hanakanaea to the Lua Makika Crater.

While Kaho‘olawe has no permanent residents, about 50 workers live in barracks on the island, and another 325 workers are flown in from Maui Island four times a week for day visits to work in the ordnance-clearing effort. Also, the island is visited regularly by members of a Native Hawaiian organization that has a special arrangement with the Navy.

2.e.(3) Outlook for Growth and Socioeconomic Change

As indicated above, future land uses on Kaho‘olawe are likely to include preservation, education and cultural uses once the island is cleared of unexploded ordnance.

Table II-1. Socioeconomic Profile of the County of Maui
(including Kalawao)

Item	1990	1999	2000	Growth since '90
Resident Population, County	100,504	n/a	128,241	27.6%
Maui Island	91,361	n/a	117,644	28.8%
Lahaina District	14,574	n/a	17,967	23.3%
Wailuku District	45,685	n/a	61,346	34.3%
Makawao District	29,207	n/a	36,476	24.9%
Hana District	1,895	n/a	1,855	-2.1%
Moloka'i Island	6,717	n/a	7,404	10.2%
Molokai, excluding Kalawao	6,587	n/a	7,257	10.2%
Kalawao County	130	n/a	147	13.1%
Lana'i Island	2,426	n/a	3,193	31.6%
Kaho'olawe Island	n/a	n/a	n/a	n/a
Visitors				
Annual Visitors, County	2,389,970	n/a	2,304,666	-3.6%
Maui	2,345,060	n/a	2,246,253	-4.2%
Moloka'i	103,630	n/a	64,559	-37.7%
Lana'i	45,930	n/a	87,662	90.9%
Average Visitor Census, County	39,500	n/a	43,854	11.0%
By Island				
Maui	38,150	n/a	41,819	9.6%
Moloka'i	1,100	n/a	904	-17.8%
Lana'i	250	n/a	1,131	352.3%
By Origin				
U.S. Visitors	36,250	n/a	37,676	3.9%
Foreign Visitors	3,250	n/a	6,178	90.1%
Income from Major Industries				
($ million)				
Visitor Expenditures, County	$ 2,097.2	n/a	$ 2,925.6	39.5%
Agricultural Sales, County	$ 151.5	n/a	$ 118.0	-22.1%
Labor				
Maui County				
Civilian Labor Force	56,500	n/a	72,400	28.1%
Employed	53,800	n/a	69,350	28.9%
Unemployed	2,700	n/a	3,050	n/a
Unemployment Rate	4.8%	n/a	4.2%	n/a

Table II-1. Socioeconomic Profile of the County of Maui (Including Kalawao)
(continued)

Item	1990	1999	2000	Growth since '90
Labor (continued)				
Maui Island				
Civilian Labor Force	52,400	n/a	67,550	28.9%
Employed	50,300	n/a	65,000	29.2%
Unemployed	2,100	n/a	2,550	n/a
Unemployment Rate	4.1%	n/a	3.8%	n/a
Lana'i				
Civilian Labor Force	1,400	n/a	1,800	28.6%
Employed	1,300	n/a	1,700	30.8%
Unemployed	100	n/a	50	n/a
Unemployment Rate	5.9%	n/a	3.5%	n/a
Moloka'i				
Civilian Labor Force	2,700	n/a	3,100	14.8%
Employed	2,200	n/a	2,650	20.5%
Unemployed	500	n/a	450	n/a
Unemployment Rate	18.1%	n/a	14.0%	n/a
County Jobs, Wage and Salary Only[1]	50,900	n/a	62,400	22.6%
Construction, mining	3,150	n/a	2,650	-15.9%
Manufacturing	1,950	n/a	1,750	-10.3%
Trans., communication, utilities	3,000	n/a	4,500	50.0%
Trade	13,650	n/a	16,700	22.3%
Finance, insurance, real estate	3,350	n/a	3,000	-10.4%
Services and miscellaneous	17,350	n/a	24,000	38.3%
Government	5,850	n/a	7,850	34.2%
Agriculture	2,600	n/a	1,950	-25.0%
Personal Income, County				
Total ($ million)	$ 2,010	$ 2,966	n/a	47.6%
Per capita	$ 19,782	$ 24,312	n/a	22.9%
Consumer Price Index—All	138.10	n/a	176.30	27.7%

1. 2000 job counts are preliminary.

Source: Department of Business, Economic Development & Tourism. The State Data Book. Annual.
Hawai'i Agricultural Statistics Service. *Statistics of Hawaii Agriculture* . Annual.

Note: Entries may not sum to totals due to rounding, slight acreage discrepancies, and overlapping land-management areas.

THE ENDANGERED SPECIES ACT[13] **CHAPTER III**

This chapter provides relevant information from the 1973 Endangered Species Act (the Act), including the role of critical habitat designation in protecting threatened and endangered species, requirements for consulting with the Service to insure that certain Federal actions do not endanger listed species or their habitats, and prohibited activities that apply to listed species.

1. ROLE OF SPECIES LISTING AND CRITICAL HABITAT DESIGNATION IN PROTECTING THREATENED AND ENDANGERED SPECIES

For species listed as threatened and endangered, the Act requires the Service to designate critical habitat to the maximum extent prudent and determinable. The Act defines critical habitat as the specific areas containing features essential to the conservation of a threatened or endangered species and that may require special management considerations or protection.

For listed species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to *jeopardize* the continued existence of the species. The Act defines *jeopardy* as any action that would appreciably reduce the likelihood of both the survival and recovery of the species.

For the critical habitat of listed species, section 7(a)(2) further requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or *adverse modification* of critical habitat. *Adverse modification* of critical habitat is defined as any direct or indirect alteration that appreciably diminishes the value of critical habitat for the survival and recovery of the species.

As stated in the proposed rule, "... critical habitat also provides non-regulatory benefits to the species by informing the public and private sectors of areas that are important for species recovery and where conservation actions would be most effective." "Critical habitat also identifies areas that may require special management considerations … and may help provide protection to areas where significant threats to the species have been identified or help to avoid accidental damage to such areas."

[13]**Note to Reader:** Readers who are already familiar with the Act may wish to skip this chapter and proceed to the next background-information chapters (Chapters IV and V), or to the economic analysis (Chapter VI).

2. CONSULTATION UNDER SECTION 7 OF THE ACT

In accordance with section 7 of the Act, the implementing regulations require Federal agencies to consult with the Service whenever activities they fund, authorize, or carry out may affect listed species or designated critical habitat. Section 7 consultation with the Service is designed to ensure that current or future Federal actions do not appreciably diminish the value of critical habitat for the survival and recovery of a listed species.

The Service has authority under section 7 to consult on activities on land owned by individuals, organizations, states, or local and tribal governments only if the activities on the land have a *Federal nexus*. A *Federal nexus* occurs when the activities require a Federal permit, license, or other authorization, or involve Federal funding. The Service does not have jurisdiction under section 7 to consult on activities occurring on non-Federal lands when the activities are not federally funded, authorized, or carried out. In addition, consultation is not required for activities that do not affect listed species or their critical habitat.

When consultations concern activities on Federal lands, the relevant Federal Action agency initiates consultation with the Service. When an activity proposed by a state or local government or private entity requires a Federal permit or is federally funded or carried out, the Federal agency with the *nexus* to the activity initiates consultation with the Service. For example, the Army Corps of Engineers is the agency that issues section 404 permits under the Clean Water Act, so it is the Action agency that initiates consultation when an activity that requires a permit may affect a listed species or designated critical habitat.

The consultation begins after the Federal Action agency determines that its action may affect one or more listed species or their designated critical habitat, even if the effects are expected to be beneficial since projects with overall beneficial effects could include some adverse impacts. Consultations are frequently conducted for multiple species if more than one species is affected by the action.

The consultation between the Federal Action agency and the Service may involve informal consultation, formal consultation in the case of adverse impacts, or both. Informal consultation may be initiated via a telephone call or letter from the Action agency, or a meeting between the Action agency and the Service. In preparing for an informal consultation, the Action agency compiles all the biological, technical, and legal information necessary to analyze the scope of the activity and discusses strategies to eliminate adverse effects on listed species or critical habitat. Through informal discussions, the Service assists the Action agency and the Applicant, if any, in identifying and resolving potential conflicts at an early stage in the planning process, and may make recommendations, if appropriate, on ways to avoid adverse effects.

If during informal consultation the Federal Action agency determines that its action (as originally proposed or revised and taking into account direct and indirect effects) "is not likely to adversely affect" listed species or critical habitat (e.g., the effects are beneficial, insignificant or discountable), and the Service agrees with that determination, then the Service provides concurrence in writing and no further consultation is required.

But if the proposed action, as revised during informal consultation, is still likely to adversely affect listed species or critical habitat, the Action agency must request in writing initiation of formal consultation with the Service and submit a complete initiation package. Formal consultations, which are subject to specific timeframes, are conducted to determine whether a proposed action is likely

to *jeopardize* the continued existence of a listed species or destroy or *adversely modify* designated critical habitat. This determination depends on the extent to which a project may affect the species. Many variables, including the project's size, location and duration, may influence the extent of the impact and, in turn, the determination of a "may affect" opinion.

If the Service finds, in its biological opinion, that a proposed action is not likely to *jeopardize* the continued existence of a listed species, or destroy or *adversely modify* the critical habitat—even though the action may adversely affect listed species or critical habitat—then the action likely can be carried out without violating section 7(a)(2) of the Act.

On the other hand, if the Service finds that a proposed action is likely to *jeopardize* the continued existence of a listed species and/or destroy or *adversely modify* the critical habitat, then the Service provides the Action agency with reasonable and prudent alternatives that will keep the action below the thresholds of *jeopardy* and/or *adverse modification*, if any can be identified.

The Service works with Action agencies and Applicants in developing reasonable and prudent alternatives. A reasonable and prudent alternative is one that (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the Action agency's legal authority and jurisdiction; and (3) is economically and technologically feasible. The Service will, in most cases, defer to the Action agency's expertise and judgment as to the feasibility of an alternative. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of a project. Costs associated with implementing reasonable and prudent alternatives vary accordingly.

3. TAKING AND OTHER RESTRICTIONS OF THE ACT

3.a. Wildlife Species

Regardless of any *Federal involvement* and/or critical habitat designation, once a species has been formally listed as threatened or endangered, it is entitled to certain regulatory protections under the Act. First and foremost, section 9 of the Act specifically prohibits the *taking* of any endangered species of fish or wildlife (the prohibition does not extend to plants). The term *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The regulations at 50 CFR section 17.3 define "harm" to mean an act that actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. In addition, endangered species, their parts or any products made from them may not be imported, exported, possessed or sold. Section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9 to threatened species. While clearly prohibiting direct injury to individuals of a listed species, the restrictions on *takings* also apply to actions that destroy or alter the habitat of a listed species if the habitat alteration would result in harm to the species.

However, the Act allows the Service to permit *take* by private applicants that would otherwise be prohibited, provided such *taking* is "incidental to, and not [for] the purpose of, the carrying out of an otherwise lawful activity." Section 10(a)(1)(B) of the Act allows non-Federal parties planning activities that have no *Federal nexus*, but which could result in the incidental *taking* of listed animals, to apply for an incidental *take* permit. The application must include a habitat conservation plan laying out the proposed actions, determining the effects of those actions on affected fish and wildlife species and their habitats (often including proposed or candidate species),

and defining measures to minimize and mitigate adverse effects. The Service may elect to issue an incidental *take* permit if the incidental *take* is to be minimized by reasonable and prudent measures and implementing terms and conditions that are stipulated in the permit.

3.b. Plant Species

Section 9(a)(2) of the Act states that it is unlawful to remove and possess any endangered plant species from areas under Federal jurisdiction; maliciously damage or destroy any such species on any such area; or remove, cut, dig up, damage, or destroy any such species on any other area in knowing violation of any state law. In addition, endangered species, their parts or any products made from them may not be delivered, received, transported, shipped or sold in interstate or foreign commerce. As above, section 4(d) of the Act gives the Service regulatory discretion to extend the protections of section 9(a)(2) to threatened plant species.

However, the Service may give permission to remove a listed plant from areas under Federal jurisdiction, and may also give permission for actions that are otherwise prohibited by section 9 of the Act for "scientific purposes or to enhance the propagation or survival of the affected species including, but not limited to, acts necessary for the establishment and maintenance of experimental populations."

EXISTING PROTECTIONS IN MAUI COUNTY[14] CHAPTER IV

In addition to the Act, other existing regulations and land-management programs protect Hawai'i's threatened and endangered species and their habitats. This chapter provides an overview of these protections, including: other Federal programs, State protections for listed species, State land-use controls affecting public and private lands, county land-use controls, and land management by various public and private organizations. Those protections in place on proposed critical habitat are summarized in Table I-1. As appropriate, the information in this chapter and in Table I-1 is used in Chapter VI to estimate the section 7 economic impacts that occur over and above impacts attributable to existing protections.

1. FEDERAL SPECIES PROTECTIONS AND LAND MANAGEMENT

1.a. Integrated Natural Resources Management Plans

The Sikes Act Improvements Act (SAIA) of 1997 requires every military installation containing land and water suitable for the conservation and management of natural resources to complete, by November 17, 2001, an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to integrate the mission of the military installation with stewardship of the natural resources found there. Each military installation that has listed species or critical habitat on areas it manages consults with the Service on its INRMP.

1.b. Conservation Partnerships Program, Pacific Islands Ecoregion

The Service's Conservation Partnerships Program is a collection of voluntary habitat restoration programs having the goal of restoring native Pacific Island ecosystems through collaborative projects with private landowners, community groups, conservation organizations, and other government agencies. The Program can provide cost-share funds, as well as information on habitat restoration techniques, native species, Safe Harbor Agreements, additional funding sources, required permits, and potential vendors of restoration services (fence contractors, nurseries, etc.) The Program is divided into five sections, discussed below.

[14] **Note to Reader:** Readers already familiar with existing protections in Hawai'i of threatened and endangered species and their habitats may wish to skip this chapter and proceed to the approach to the analysis (Chapter V), or to the economic analysis (Chapter VI).

1.b.(1) Partners for Fish and Wildlife Program

The Partners for Fish and Wildlife (PFW) Program is the Service's habitat restoration program for long-term conservation on private land. The PFW Program was established to offer technical and financial assistance to landowners who wish to restore wildlife habitat on their property. PFW Programs can include constructing fences to exclude feral ungulates; controlling the population of feral ungulates, weeds, rodents, and alien insects; restoring native ecosystem elements such as hydrology and micro-habitat conditions; and reintroducing native species.

The Service provides assistance ranging from informal advice on the location and design of potential restoration projects to cost-shared funding under a formal cooperative agreement with the landowner. If warranted, the Service also provides participating landowners with technical assistance to develop Safe Harbor Agreements that cover habitat managed for endangered or threatened species. The Agreements provide assurances to landowners that additional land, water, and/or restrictions on uses of natural resources will not be imposed as a result of their voluntary conservation actions.

Since funding is limited, the projects given the highest priority are those that manage or reestablish natural biological communities and provide long-term benefits to declining migratory bird and fish species and species that are endangered, threatened, or proposed for listing; and projects on private lands that provide expanded habitat for wildlife populations that inhabit National Wildlife Refuges.

1.b.(2) The Hawai'i Biodiversity Joint Venture

The Hawai'i Biodiversity Joint Venture (HBJV) is a public-private effort to protect, maintain, improve, and restore the native biological diversity of the Hawaiian Islands. In this program, the Service's mission is to work with others to conserve, protect, and enhance fish, wildlife, and plant populations and their habitats.

The HBJV was initiated with the following goals:

— Maintain natural communities and habitats for native species;

— Support efforts to cooperatively manage significant native ecosystems on public and private land;

— Develop natural resource management techniques to address widespread threats (such as feral ungulates, weeds, rats, and alien insects) to Hawai'i's native ecosystems;

— Restore former wetlands, native forests and other natural communities on public and private lands; and

— Protect native Hawaiian ecosystems and natural communities through land and water acquisition and management.

Since funding is limited, the Service gives priority to projects that implement management or research actions that directly contribute to protecting or restoring habitats for multiple endangered,

threatened, candidate, or rare species; address key threats to native ecosystems or habitats; and benefit rare or unique ecosystems or habitats.

1.b.(3) Pacific Islands Coastal Program

The Pacific Islands Coastal Program identifies and conserves important coastal natural resources. The goals of the program are to:

— Identify and prioritize coastal natural resources and threats;

— Implement on-the-ground projects in partnership with others; and

— Promote public stewardship of coastal fish, wildlife, plants and their habitats.

The objectives of the program include:

— Protecting and restoring coastal wetlands and uplands, anchialine pools, estuaries, coral reefs and streams;

— Preventing and eradicating invasive alien species in coastal areas;

— Protecting and restoring watersheds for native species' habitat needs;

— Building public support through partnerships, education and community involvement; and

— Inventorying and mapping coastal resources.

1.b.(4) Endangered Species Landowner Incentive Program

The Endangered Species Landowner Incentive Program is a focused effort to combine cost-share funds and regulatory relief incentives (Safe Harbor Agreements and Candidate Conservation Agreements) to address high-priority habitat restoration needs of endangered, threatened and candidate species.

1.b.(5) Other Habitat Restoration Programs

Other Habitat Restoration Programs include the National Coastal Wetlands Conservation Grant Program and the North American Wetlands Conservation Grant Program. In addition, the Conservation Partnerships Program seeks to provide a connection between habitat restoration projects and non-Service funding sources.

1.c. Wildlife Habitat Incentives Program

Under the Wildlife Habitat Incentives Program (WHIP), the Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture (USDA) provides assistance to landowners and lessees (leases must be five years or more) to protect and restore Hawai'i's native habitats as well as habitats of threatened and endangered species. In Hawai'i, the focus is on the following habitats:

— Threatened/endangered plant species habitat;

— Native forests/riparian areas adjacent or connected to a native forest reserve, wildlife refuge, or other preserved forest/riparian area;

— Montane wetlands and bogs;

— Coastal dunes that support rare plants, seabirds, monk seals or turtles;

— Anchialine pools;

— Endangered waterbird and migratory bird habitat; and

— Caves and rare species habitat.

The NRCS works with private landowners and lessees to help them develop a Wildlife Habitat Development Plan for their land that benefits native wildlife and meets other goals and objectives of WHIP. If the Plan is selected for funding, a five- to 10-year contract is entered into whereby the landowner or lessee agrees to undertake wildlife habitat development practices such as noxious weed control, fencing, planting of native trees, and wetland restoration. In turn, NRCS reimburses the landowner or lessee 75 percent of the cost of carrying out these practices at specified rates. However, the funds cannot be used for mitigation of any kind, or on any land designated as converted wetland.

1.d. Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) is a voluntary USDA conservation program for farmers and ranchers who wish to address serious threats to soil, water, and related natural resources on their property. Administered through NRCS, EQIP provides technical, financial and education assistance for designated priority areas or significant statewide resource concerns.

Eligible land includes cropland, rangeland, pasture, forestland, and other farm or ranch lands. To evaluate proposed EQIP projects, NRCS first assesses the environmental benefits to be achieved from the planned implementation of conservation practices. Subsequently, applications are then ranked based on the amount of financial assistance requested and the projected environmental benefits.

EQIP offers five- to 10-year contracts for the implementation of conservation practices in each site-specific conservation plan. Each conservation plan, developed with assistance from NRCS or other service provider, must treat the targeted resource concern to a sustainable level. NRCS may pay up to 75 percent of the costs for eligible conservation practices which improve or maintain the health of the natural resources in the area.

Within Maui County, the east end of Moloka‘i has been designated as an EQIP priority area to address resource concerns about erosion, sedimentation, pest infestation and insufficient water supply.

1.e. Conservation Reserve Program

The Conservation Reserve Program (CRP) is a voluntary program administered through the Farm Service Agency, with technical assistance provided by the NRCS. By offering annual rental and cost-share assistance, NRCS encourages farmers and ranchers to plant long-term vegetative cover to improve soil, water, and wildlife resources.

To be eligible for CRP, land must have been planted in an agricultural commodity two out of the last five years. Some marginal pastureland may also quality for CRP if suitable for planting. In addition, the land must be considered highly erodible or subject to scour erosion. Finally, the land must be devoted to any of a number of highly beneficial environmental practices, such as filter strips, riparian buffers, grass waterways, shelter belts, wellhead protection areas, and other similar practices.

Annual rental payments are made based on the agricultural rental value of the land. Cost-share assistance will cover up to 50 percent of the cost of establishing the grass or trees on the land. CRP contracts last from 10 to 15 years, depending on the goals of the operator.

1.f. National Parks

The National Park System, operated by the National Parks Service, was established to preserve natural areas in the United States so that they can be enjoyed by current generations and preserved for future generations. Within Maui County, Maui and Moloka'i each has a national park.

— Haleakala National Park (Maui): this park covers 28,655 acres (44.8 square miles), including the summit of Haleakala, Haleakala Crater, Kipahulu Valley (a biological reserve closed to the public), and Ohe'o Gulch, which extends down to the sea. Mostly wilderness, the Park is home to 11 threatened and endangered plant species and the endangered Sphinx moth. A 1999 Haleakala National Park draft *Resources Management Plan* provides for permanent protection and management of the lands within the Park, and details the management issues and strategies used by the Park to protect, restore and enhance the rare and native plants and their habitat. These strategies include control of or research on non-native ungulates, rodents, invertebrates and weeds; fire control; and habitat restoration.

— Kalaupapa National Historical Park (Moloka'i): this park contains the historic Hansen's disease isolation settlement of Kalaupapa, which consists of 1) a residential area on the leeward (western) side of the Kalaupapa Peninsula that is still home to many Hansen's disease residents; 2) two historic churches in Kalawao on the windward (eastern) side; and 3) a small airport and a lighthouse built in 1909 on the northern tip of the Peninsula. The Park and the lighthouse are listed separately on the National Register of Historic Places as national historic landmarks. A section of the Park is also within the North Shore Cliffs National Natural Landmark.

1.g. National Wildlife Refuges

Over 500 National Wildlife Refuges across the United States form a system of habitats managed by the Service. Hawai'i's Refuges were established to protect the Islands' unique native

plants and animals and their habitats. Within Maui County, Maui and Moloka'i each contains a Refuge.

— Kealia Pond National Wildlife Refuge (Maui): Kealia Pond, which covers 50 to 400 acres depending upon the season, lies adjacent to Ma'alaea Bay along the south central coast of Maui near the town of Kihei. The main body of the pond is separated from the Pacific Ocean by a narrow band of coastal sand dunes and a major road. The refuge protects the Hawaiian stilt, Hawaiian coot, black-crowned night heron, Hawaiian duck, migratory waterfowl, seabirds and introduced species.

— Kakahaia National Wildlife Refuge (Moloka'i): five miles east of the main town of Kaunakakai, this refuge protects the endangered Hawaiian coot and Hawaiian stilt, as well as 10 other species of bird. This 44-acre refuge contains a 15-acre freshwater pond, a seven-acre manmade impoundment built to provide additional shallow water habitat, and a marsh with dense thickets of bulrush.

2. STATE LAND MANAGEMENT

2.a. State Districting

All lands in Hawai'i are allocated by the State into one of four districts: Conservation, Agricultural, Urban or Rural. The State, through its Department of Land and Natural Resources (DLNR) and its Board of Land and Natural Resources (the Board), has primary land-management responsibility for activities and development in the Conservation District, while the counties have primary responsibility in the Urban, Rural and Agricultural Districts.

2.b. The Conservation District

The purpose of the Conservation District is to conserve, protect and preserve the State's important natural resources through appropriate management in order to promote the long-term sustainability of these natural resources, and to promote public health, safety and welfare (Hawai'i Revised Statutes, Chapter 183C). To this end, only limited development and commercial activity are allowed in the Conservation District. "Important natural resources" include the watersheds that supply potable water and water for agriculture; natural ecosystems and sanctuaries of native flora and fauna, particularly those which are endangered; forest areas; scenic areas; significant historical, cultural, archaeological, geological, mineral and volcanological features and sites; and other designated unique areas.

Permission is required to use land, construct facilities, or conduct other activities in the Conservation District (see below). Permits for routine uses or activities are issued by DLNR, while more complex activities or uses (such as certain construction projects and commercial operations) require formal approval of a Conservation District Use Application (CDUA) by the Board, and often require an approved management plan.

2.c. Conservation District Subzones

All land in the Conservation District has been assigned to one of five subzones that reflect a hierarchy of uses from the most restrictive to the most permissive. These subzones are the

Protective Subzone (the most restrictive), Limited, Resource, General and Special (Hawai'i Administrative Rules, Title 13, Chapter 5). Except for the Special Subzone, all uses and activities allowed in a more restrictive subzone in the hierarchy are allowed in the less restrictive subzones.

2.c.(1) Protective Subzone

The Protective Subzone, the most restrictive of the five subzones, was established to "… protect valuable resources in designated areas such as restricted watersheds, plant and wildlife sanctuaries, and other designated natural and unique areas." Correspondingly, lands and waters generally included in this subzone are needed to protect watersheds, water sources, and water supplies; and to preserve the natural ecosystems of native plants and wildlife, particularly endangered species.

No structures, homes, or farm activities are allowed in the Protective Subzone, with two exceptions. First, the land can be used by State and county governments and by non-government entities that serve the public (e.g., the local utility companies) "for public purpose"—i.e., to fulfill mandated government functions for the public benefit such as transportation systems, water systems, and communications systems or recreational facilities. Second, Native Hawaiians owning *kuleana* land (land that was granted to Native-Hawaiian tenants in the mid-1800s) may use it for agriculture or single-family residences if their land was used "historically and customarily" for these purposes.

Allowed uses (by permit or Board approval) in the Protective Subzone include: replacing or reconstructing an existing structure and some types of accessory structures, habitat improvements for plant and wildlife sanctuaries, Natural Area Reserves, wilderness areas and scenic areas, limited removal of certain trees, and removal of noxious plants from small areas provided that the ground is not disturbed significantly. Limited landscaping is allowed, but is restricted to plants that are endemic or indigenous; alien subspecies are specifically prohibited.

2.c.(2) Limited Subzone

The Limited Subzone encompasses areas that are potentially dangerous to the public due to possible flooding, soil erosion, *tsunami* (tidal waves), volcanic activity or landslides. Lands having a general slope of 40 percent or more are also included in this subzone. The purpose of the Limited Subzone is to limit uses where natural conditions suggest that human activity should be constrained.

In addition to what is permitted in the Protective Subzone, the following activities and uses are allowed in the Limited Subzone by permit or Board approval: accessory structures near existing structures; single-family homes (one per lot) if State and county regulations are followed; agricultural activities; facilities or devices used to control erosion, floods and other hazards; botanical gardens and private parks; landscaping; and removal of noxious plants in areas larger than 10,000 square feet that result in significant ground disturbance.

2.c.(3) Resource Subzone

The Resource Subzone encompasses lands that are suitable for growing and harvesting commercial timber or other forest products, park land, and land for outdoor recreation (hunting, fishing, hiking, camping and picnicking, etc.). The purpose of the Resource Subzone is to develop properly managed areas to ensure the sustainable use of Hawai'i's natural resources.

In addition to what is permitted in the Protective and Limited Subzones, the following activities and uses are allowed in the Resource Subzone by permit or Board approval: commercial forestry under an approved management plan, and mining and extraction of any material or natural resource.

2.c.(4) General Subzone

The General Subzone is used to designate open space where special conservation uses may not yet be defined, but where urban uses may be premature. This subzone encompasses lands that may not be adaptable to or needed currently for urban, rural or agricultural use. The General Subzone also includes lands that are suitable for farming, flower gardening, nursery operations, orchards and grazing. Golf courses are not allowed.

In addition to what is permitted in the Protective, Limited and Resource Subzones, facilities necessary for the above-mentioned uses are allowed by permit when these facilities are compatible with the natural physical environment, and the use promotes natural open space and scenic value.

2.c.(5) Special Subzone

Special Subzones are designated for educational, recreational and research purposes. These subzones set aside lands possessing unique developmental qualities that complement the natural resources of an area.

2.d. Additional Management in the Conservation District

In addition to the five subzones in the Conservation District, the State has established further controls by defining other areas it manages within the Conservation District. These include Forest Reserves, the Natural Area Reserve system, State Hunting Units, State parks and State trails. These are discussed below.

2.d.(1) Forest Reserves

State Forest Reserves were first established in Hawai‘i over a century ago to protect the supply of high-quality water that was being threatened due to the destruction of Hawai‘i’s rainforests. The stated purpose of a Forest Reserve is to protect native ecosystems and important watersheds (Hawai‘i Revised Statutes, Sections 183-2 and 183-17). Most of Hawai‘i’s Forest Reserves are in the Resource Subzone. Limited collecting for personal use (e.g., *ti* leaves and bamboo) is allowed by permit, as is limited (no more than $3,000 value per year) commercial harvesting of timber, seedlings, greenery and tree ferns. Commercial forestry operations are allowed only with approval from the Board. Permission is required to reside in a Forest Reserve, hunt (see below), camp and fish. Land vehicles, mountain bikes, horses, mules and leashed dogs are allowed on designated roads and trails.

Collecting endangered or threatened plants or wildlife is not allowed and, except in the situations described above or with Board approval, no forms of plant or animal life may be removed, injured or killed.

Within Maui County, State Forest Reserves are found on Maui and Moloka‘i. Maui is home to the West Maui, Ko‘olau, Hana, Kipahulu, Kahikinui, Kula, and Makawao Forest Reserves; and Moloka‘i is home to the Moloka‘i Forest Reserve.

2.d.(2) Natural Area Reserves

A Natural Area Reserve (NAR) is based on the concept of protecting ecosystems rather than individual species, with the goal of preserving and protecting representative samples of Hawaiian biological ecosystems and geological formations (Hawai'i Revised Statutes, Sect. 195-5). Although most NARs are located in the State Conservation District, they can include land in other Districts.

Management activities in a NAR include restoring and enhancing existing populations of native plants, removing non-native weeds, and working with local hunters to keep non-native animal populations low in sensitive areas.

Permitted activities in NARs include hiking, nature study and bedroll camping. Game hunting and research or educational activities are allowed by permit. Prohibited activities in NARs include: improvements or construction; tent camping; vehicles, except on designated roads; and removing, injuring, killing or introducing plants or wildlife.

Within Maui County, NARs are found on Maui and Moloka'i. Maui is home to the following NARs:

— 'Ahihi-Kina'u (2,045 acres): this reserve is the first reserve created under the Natural Area Reserve System. Sparsely vegetated, the reserve is unique in that it contains an example of the most recent lava flow on the dry south flank of East Maui. The reserve also contains a marine area with high and low salinity anchialine pools that house a diversity of rare Hawaiian shrimps and native Hawaiian cave animals in coastal lava tubes. Coastal dry shrublands, coastal mesic boulder beach communities, and examples of pioneer vegetation can also be found within this NAR serving as habitats for other rare native plants and animals.

— West Maui (6,702 acres): this reserve encompasses lowland and montane native communities ranging from dry grasslands to wet ohi'a forests. The reserve also includes bogs, montane lakes, forest bird habitat, and rare and endangered plants. The areas are extremely important watershed sites which contain the headwaters of perennial streams.

— Hanawi (7,500 acres): this reserve is located on the wet slopes of the north flank of Haleakala. It contains a rare subalpine grassland as well as montane and lowland semi-wet and wet grasslands and forests. Rare plants and endangered birds are also protected in this reserve.

— Kanaio (876 acres): this reserve is located in rough lava terrain on the southeast slope of Haleakala. The reserve protects a remnant of the native dryland forest that once covered the leeward slope of Haleakala. Kanaio provides visitors with a rich assemblage of native dryland trees and shrubs.

Moloka'i is home to the following NARs:

— Pu'u Ali'i (1,330 acres): located in the mountains of northern Moloka'i, this reserve is a wet summit plateau inhabited by wet forests, mixed fern and

shrub montane cliff communities, wet shrublands, and Hawaiian intermittent stream communities. The reserve also contains forest bird habitat and is an important part of the Moloka'i watershed.

— Oloku'i (1,520 acres): one of the few areas left undisturbed by feral ungulates, this reserve encompasses an isolated, cloud-shrouded mountain plateau with slopes extending down to sea cliffs. The reserve contains both wet and dry ecosystems, coastal dry grasslands, lowland and montane wet and mesic forests. Rare snails were also observed during a 1989 survey of this area.

2.d.(3) Wildlife Sanctuaries

Wildlife sanctuaries are established by the State to conserve, manage and protect indigenous wildlife (Hawai'i Revised Statutes, Sections 13-125). Within these sanctuaries, the following activities are prohibited: (1) to remove, disturb, kill, or possess any form of plant or wildlife; and (2) to introduce any form of plant or animal life. Also, human activity is strictly limited: no firearms or hunting equipment are allowed in nearly all sanctuaries; no camping, no fires, and no vehicles are allowed except on designated roads; and, in many cases, no entry is allowed except by permit for scientific, educational, or conservation purposes.

Several bird, plant, and other wildlife sanctuaries exist in Maui County. Wildlife sanctuaries in Maui include Pauwalu Point Wildlife Sanctuary located on the north shore of East Maui; the Manawainui Plant Sanctuary in West Maui; and several seabird sanctuaries along the island's coast. Moloka'i's wildlife sanctuaries include Mokapu Bird Sanctuary located on an islet off the north shore; the Kamiloloa Plant Sanctuary in East Moloka'i; and a few seabird sanctuaries along the coast of East Moloka'i. Finally, Lana'i also maintains several seabird sanctuaries located mostly along the south coast.

2.d.(4) Hunting Units

A total of 47 hunting units, administered by DLNR, have been established across the State to control game hunting (Hawai'i Administrative Rules, Title 13, Chapters 122 and 123). Maui has seven such hunting units totaling 105,318 acres for hunting feral pigs and goats, pheasant (two species), Francolin (two species), chukar partridge, quail (two species), dove (two species), and wild turkey. Moloka'i also has seven hunting units totaling about 16,000 acres; these units feature feral pigs, goats, and axis deer; ringneck pheasant; chukar partridge; Francolin (two species); quail (two species); dove (two species); and wild turkey. Finally, Lana'i has two hunting units, encompassing the western third of the island and totaling about 30,000 acres. These two hunting units are available for hunting axis deer, mouflon sheep, ring-necked pheasant, chukar partridge, Francolin (two species), quail (three species), dove (two species), and wild turkey. An additional 30,000 acres are privately managed for hunting in Lana'i.

Within the State Hunting Units, hunting is a licensed activity and is restricted. Restrictions vary among the islands and address: bag limits, hunting seasons, days allowed, hours of the day, and hunting method (rifle, muzzleloader, shotgun, handgun, bow and arrows, spear, dogs and knives). DLNR's intent is to manage the hunting areas, game-mammal populations, and the level of hunting activity to achieve a reasonable balance between (1) recreational benefits for hunters and (2) protection to native ecosystems and threatened and endangered plants. Game hunting restrictions on private land are set by the landowner.

2.d.(5) State Parks

The State Parks System was established to govern the use and protection of all lands and historical and natural resources in Hawai'i's State parks (Hawai'i Revised Statutes, Sections 184-3 and 184-5). Within State parks, approvals are required from the Board to erect communications equipment (such as aerials, antennas and transmitters), vacation cabins, and concession facilities. Activities requiring permits from DLNR include limited camping, lodging (e.g., private and State cabins), fresh-water fishing, and hiking on certain trails. Uses allowed without a permit include limited collecting of renewable products (fruits, berries, flowers, seeds, and pine cones) for personal use; hiking on most trails; picnicking; and mountain biking (unless posted signs indicate otherwise).

Within Maui County, Maui and Moloka'i both feature State parks. The following State parks are located on Maui:

— Wainapanapa State Park: this 122-acre State Park is located on the eastern most part of the island encompassing remote, wild, low-cliffed volcanic coastline. Activities allowed in the park include lodging, camping, picnicking, shore fishing and hiking.

— 'Iao Valley State Park: this 6.2-acre State Park is located in 'Iao Valley in the western portion of the island. It has a scenic viewpoint of the 'Iao Needle, an erosional feature which abruptly rises 1,200 feet from the valley floor.

— Polipoli Spring State Park: this 10-acre State Park is at 6,200 feet elevation in Kula Forest Reserve. Activities allowed in the park include camping, lodging, and limited hunting

Moloka'i has one State park:

— Pala'au State Park: located at the end of Kalae Highway in north Moloka'i, Pala'au State Park contains a scenic overlook to Kalaupapa National Historical Park. The park offers picnicking and camping in an ironwood grove, and a short trail within the Park that leads to a stone believed to enhance fertility.

2.d.(6) Na Ala Hele State Trail and Access Program

The purpose of the Na Ala Hele State Trail and Access Program is to preserve and perpetuate the integrity, condition, naturalness and beauty of State trails and surrounding areas, and to protect environmental resources (Hawai'i Revised Statutes, Sections 198D-11 and 198D-6).

Activities allowed under this program by permit from DLNR include camping, hunting and fishing. Some trails are specified for commercial activity (e.g., commercial hikes on designated trails), but no commercial activity is permitted on a trail if it will compromise the quality and nature of the experience or cause any damage to the integrity or condition of the trail or the surrounding environment. Prohibited uses include collecting, removing, injuring or killing a plant or animal; and introducing plants or wildlife.

2.d.(7) Natural Area Partnership (NAP) Program

Under the Natural Area Partnership (NAP) program, the State provides two-thirds of the management costs for private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. The NAP program can support a full range of management activities to protect, restore, or enhance significant native resources or geological features.

To qualify, the applicant must be a landowner or manager of private lands of high natural area quality. Other requirements include: (1) permanent dedication of the private lands through a transfer of fee title or a conservation easement to the State or a "cooperating entity" such as The Nature Conservancy of Hawai'i, and (2) management of the lands according to a detailed management plan approved by the Board of Land and Natural Resources. A "cooperating entity" is a private non-profit landholding organization or any other body deemed by DLNR to be able to assist in the management of natural areas.

NAP program funding is used to manage Waikamoi and Kapunakea Preserves and Pu'u Kukui Watershed Management Area in Maui; Kamakou, Mo'omomi, and Pelekunu Preserves in Moloka'i; and Kanepu'u Preserve in Lana'i. These areas are discussed more in detail later in the chapter under the "Other Land Management" section.

3. STATE SPECIES PROTECTIONS

3.a. Protection of Threatened and Endangered Wildlife and Ecosystems

The State has established various laws and administrative rules to protect threatened and endangered wildlife and their ecosystems. The Administrative Rule "Indigenous Wildlife, Endangered and Threatened Wildlife, and Introduced Wild Birds," implements a State act that was specifically designed to conserve, manage, protect and enhance indigenous wildlife, endangered and threatened wildlife, and introduced wild birds (Hawai'i Administrative Rules, Chapter 13-124). The State list of threatened and endangered species includes by reference species on the Federal list.

With regard to threatened and endangered wildlife species, prohibited activities include *taking*, possessing, processing, selling, offering for sale, or transporting these species. Nor can their nests be removed, damaged or disturbed, or their young, eggs, dead body or skin be removed from the State of Hawai'i. Nor does DLNR issue permits to destroy or otherwise control threatened or endangered species of wildlife or introduced wildlife. However, these rules do not apply to authorized employees of DLNR, the State Department of Agriculture, and the Service if the employees are acting in the course of their official duties. Also, "incidental *takes*" are allowed subject to approved habitat conservation plans and safe harbor agreements (Hawai'i Revised Statutes, Chapter 195D).

Similarly, the State has established various laws and administrative rules to protect threatened and endangered plants and their ecosystems, which in turn helps protect wildlife. The Administrative Rule "Threatened and Endangered Plants," implements a State act that was specifically designed to conserve, manage, protect and enhance native threatened and endangered plants (Hawai'i Revised Statutes, Sect. 195D). Prohibited activities include the taking, selling, delivering, carrying, shipping, transporting, or exporting of any native endangered or threatened plant. However, license holders may sell such plants if the plants are garden-grown. And

"incidental *takes*" are allowed subject to approved habitat conservation plans and safe harbor agreements (Hawai'i Revised Statutes, Chapter 195D).

As discussed above, additional protections of threatened and endangered wildlife and ecosystems are embedded in separate laws governing the State Conservation District, State Forest Reserves, State parks, and designated State trails. Also, the State has laws to protect, conserve and preserve ecosystems in NARs, as well as native ecosystems and important watersheds in State Forest Reserves. Under the NAP program, the State shares in the land management costs of private landowners who agree to permanently protect intact native ecosystems, essential habitat for threatened and endangered species, or areas with other significant biological resources. Limited taking of flora is allowed, but only in State parks and State Forest Reserves, and only if the flora is not endangered or threatened. In State parks, collecting or gathering reasonable quantities of natural renewable products–such as fruits, berries, flowers, seeds, and pine cones–is allowed for personal use without a permit. In Forest Reserves, limited colleting for personal use (e.g., *ti* leaves and bamboo) and limited commercial harvesting (e.g., timber, seedlings, greenery and tree ferns) is allowed by permit. Commercial forestry operations are allowed only with approval of the Board.

3.b. State Environmental Assessments and Environmental Impact Statements

Hawai'i State law calls for efforts to prevent or eliminate damage to the environment and biosphere and to protect endangered species and indigenous plants and animals. To meet this and other goals, Hawai'i's Environmental Impact Statement (EIS) law (Hawai'i Revised Statutes 343), which is administered by the State Office of Environmental Quality Control (OEQC), requires that an Environmental Assessment (EA) and/or EIS be prepared for many development projects. The law requires that government give systematic consideration to the environmental, social and economic consequences of proposed development projects before granting permits for construction. For impacts on biological resources, OEQC guidelines call for biological surveys, an ecosystem impact analysis, and proposed mitigating measures. The requirements and guidelines apply to development projects in the State Agricultural, Urban, Rural and Conservation Districts.

4. COUNTY LAND MANAGEMENT

While the State manages land in the Conservation District, the counties have primary management responsibility for land in the other three State Districts: Agricultural, Urban and Rural. Also, development along the shoreline is subject to county regulation, even for land in the Conservation District.

4.a. Agricultural District

The Agricultural District includes "good" farm land and, from an agricultural perspective, land that is commonly referred to as "junk" land because it is unsuitable for farming or ranching. "Junk" land includes gulches, steep hillsides, rocky land and, on Maui and the Big Island, even relatively recent lava flows having little or no topsoil. This districting of "junk land" into the Agricultural District reflects the fact that this district is a catch-all category that includes all lands not otherwise categorized, regardless of the agricultural quality of the land.

Crops, livestock and grazing are permitted in the Agricultural District, as are accessory structures and farmhouses. Although land in the Agricultural District is not meant to be urbanized it is, in practice, sometimes used for large-lot subdivisions.

Listed species are found in some parts of the Agricultural District, particularly in gulches, on hillsides, and on some of the land that is used for low-intensity grazing. In many cases, the fact that the land is in the Agricultural District indirectly protects listed species by limiting urban sprawl.

4.b. Rural and Urban Districting

The State Urban and Rural Districts in each county are subject to county land use and development (commercial, industrial, residential, etc.) regulations, including county community plans, zoning, and building code regulations.

4.c. Coastal Zone Management Program and Special Management Areas

As mandated by Hawai'i Coastal Zone Management program, the county has an additional layer of regulation that provides special controls on development in Special Management Areas (SMAs) located along the shoreline. Development in an SMA requires an SMA Use Permit from the county where the development is proposed. The intent is to avoid the permanent loss of valuable resources and to ensure adequate access to beaches, recreation areas and natural reserves (Hawai'i Revised Statutes, Chapter 205A). Although SMAs are defined to include all lands extending not fewer than 100 yards inland from the shoreline, counties can amend their boundaries to achieve certain Costal Zone Management objectives. Amendments removing areas from an SMA are subject to State review for compliance with the coastal law.

4.d. County Boards of Water Supply

Boards of Water Supply in each county own and manage land in their island watersheds in order to protect their county's supply of water. Watersheds generally include mountainous areas.

5. OTHER LAND MANAGEMENT

Other land management activities that are not the responsibility of the State or county governments are discussed below.

5.a. Preserves Involving The Nature Conservancy of Hawai'i (TNCH)

The Nature Conservancy of Hawai'i (TNCH) is a private, non-profit affiliate of a national organization that works with Federal, State and private partners to protect Hawai'i's natural areas that shelter native species. The mission of TNCH is to preserve Hawai'i's native plants, animals, and natural communities by protecting the lands and waters needed for their survival. In managing the preserves TNCH often takes advantage of Hawai'i's NAP program whereby the State provides two-thirds of the cost of managing private land dedicated to conservation (see discussion of NAP in Section 2.d.).

Management goals for the preserves include some or all of the following: (1) control non-native species; (2) suppress wildfire; (3) restore the integrity of dryland forest ecosystem; (4) reduce damage caused by feral ungulates and small mammals; and (5) prevent extinction of rare species in the preserves. General management actions taken to attain the aforementioned goals include various fencing; monitoring and researching native plant species; hunting to control ungulate population; controlling weeds; and other various programs to prevent wildfire, control non-native plants, etc. Brief descriptions of the preserves in Maui County with TNCH involvement are presented below.

Maui maintains the following preserves:

— Waikamoi and Kapunakea Preserves

Waikamoi Preserve on the northeast flank of Haleakala is a 5,230-acre sanctuary for hundreds of native Hawaiian species and a vital watershed for Upcountry Maui. The Haleakala Ranch Company conveyed the management rights to TNCH in 1983. The 1,264-acre Kapunakea Preserve in the West Maui Mountains was established in 1992 when Amfac/JMB Hawai‘i, Inc. granted TNCH a perpetual conservation easement over the area.

— Pu‘u Kukui Watershed Management Area

Located on the West Maui Mountains and owned by Maui Land & Pineapple Co., Ltd., the 8,600-acre Pu‘u Kukui Watershed Management Area (WMA) is the largest single private nature preserve in Hawai‘i. Seven listed species are known to exist in this WMA.

Moloka‘i maintains the following preserves:

— Pelekunu Preserve (5,714 acres)

Located along Moloka‘i’s extremely rugged north coast, featuring the tallest sea cliffs in the world, Pelekunu Preserve protects one of Hawai‘i’s last remaining free-flowing streams. The Preserve is also home to at least seven native aquatic species. The land is owned by the Nature Conservancy, who purchased the land primarily from Moloka‘i Ranch, Ltd. in 1987.

— Kamakou Preserve (2,274 acres)

Kamakou Preserve is a lush rain forest located in the mountainous interior of East Moloka‘i near the summit of the island’s highest mountain. The Preserve contains 37 rare plant species, of which 18 are listed as federally endangered, and contains habitat for five native forest birds and five rare native land snail species. It is also home to countless native insects, snails, and a unique array of birds. The land is owned by Moloka‘i Ranch, Ltd., which, in 1982, granted a conservation easement to TNCH to restore the area and protect it in perpetuity.

— Mo‘omomi Preserve (921 acres)

The Mo‘omomi Preserve is located on the northwest coast of West Moloka‘i. Its windswept dunes shelter more rare coastal native grasses and shrubs than any other single place in the main Hawaiian islands, as well as nests of the endangered green sea turtle and sites of Hawaiian prehistory, paleontology and geology. The Preserve was created in 1988 on land purchased by TNCH.

Lana‘i maintains one preserve:

— Kanepu‘u Preserve

The 590-acre Kanepu'u Preserve, in the northwest central portion of the island on its western plateau, contains the largest remnants of Hawai'i's extremely rare *olopua/lama* dryland forest and is home to 49 plant species found nowhere else in the world. The Kanepu'u Preserve contains the Kanepu'u Trail, which has eight stations with interpretive signs describing particular features of natural or cultural significance in the Preserve. The Service reports one listed plant species in this Preserve.

The area has been protected since 1918, when George Munro (a naturalist and rancher) worked to slow the erosion that had already removed much of the topsoil from the western plateau. Over 30 years, Munro removed feral pigs, planted windbreaks, and erected fences to protect *lama* (native ebony) and *olopua* (native olive) from introduced cattle, pigs, sheep, and axis deer. Munro's legacy was carried forth by Hui Malama Pono O Lana'i, a community group that remains active in managing the area. In 1991, Castle & Cooke granted a conservation easement to TNCH to continue to restore the forest and ensure its long-term protection.

5.b. Watershed Partnerships

5.b.(1) Maui Watershed Partnerships

Maui has two Watershed Partnerships—the East Maui Watershed Partnership (EMWP) covering about 100,000 acres of watershed, and the West Maui Mountains Watershed Partnership (WMMWP) of about 50,000 acres. These large areas include all or most of Haleakala National Park, the Protective and Limited Subzones of the Conservation District, State forest reserves, State NARs, the Manawainui Plant Sanctuary, State-managed hunting units, State trails, the portion of the West Maui watershed managed by the county Board of Water Supply, the private Waikamoi and Kapunakea Preserves (see above), the private Pu'u Kukui Watershed Management Area (see above) and, for the EMWP, considerable land in the Agricultural District.

Members of the EMWP include DLNR, the Federal government (the National Park Service), TNCH and private landowners. The WMMWP has members from the State, TNCH, the Maui County Board of Water Supply, and private landowners.

Participants in the Watershed Partnerships pool their expertise and other resources to implement an active watershed management program with the basic objective being to protect the watershed ecosystems in perpetuity. Watershed management programs include water and watershed resource monitoring, pest animal control, weed control, public education and awareness, and management of infrastructure improvements. Planned activities in West Maui include installation of 58 strategic fences, removal of ungulates above the fences, reduction in ungulate populations below the fences, and control of invasive weeds.

5.b.(2) Moloka'i: East Moloka'i Watershed Partnership

Moloka'i's sole watershed partnership, the East Moloka'i Watershed Partnership (EMWP), was formed in late 1999. It encompasses about 22,000 acres extending from the mountainous interior of East Moloka'i down to both the north and south shorelines. The area includes the Kalaupapa Historical National Park, the island's two NARs, Pelekunu and Kamakou Preserves (see above), and State-managed hunting units. The area encompasses considerable land in the Conservation and Agriculture Districts and a small amount of land in the Urban District.

Membership in the EMWP includes private landowners (Kamehameha Schools, Kapualei Ranch), the State DLNR Division of Forestry and Wildlife, TNCH, Maui County, the Maui Board of Water Supply, Ke Aupuni Lokahi Enterprise Community Governance Board (a grassroots community organization), and Federal agencies (the National Park Service, the Environmental Protection Agency, NRCS, the U.S. Geological Services, and the Service).

The main focus of the partnership is to protect and enhance high-quality native Hawaiian rain forest communities. Using the traditional *ahupua'a* (i.e., Hawaiian land division) approach to dividing land for resource management, watersheds are to be protected from the mountain-top to the sea. Participants in the EMWP share expertise and provide funding and other resources to implement an active watershed management program designed to maintain and increase the watershed capacity and reduce erosion. Upper elevations (above 3,500 feet) are to be kept free of feral animals by installing contour fencing. At mid-elevations (1,000 to 3,500 feet), goat populations are to be reduced to allow recovery of vegetation. Also, a monitoring system will be established to help with long-range planning.

The initial focus of EMWP's efforts will be the Kamalo/Kapualei watershed project on the south side of the island. The goal of this project is to protect and restore 2,000 acres of native rainforest and shrub land by fencing and removing feral goats and pigs from the upper elevations. An existing five mile long fence may be extended in both east and west directions as neighboring landowners agree to participate.

5.b.(3) Lana'i: Lana'ihale Watershed Partnership

The summit of Lana'i's only mountain, Lana'ihale, is the home of a valuable watershed for Lana'i's aquifer. It is estimated that about 50 percent of the water in the Lana'i aquifer comes not from rain but from "fog drip", which occurs when the trees and ferns in the upper regions of the mountain rake moisture from passing clouds. Many of the trees and plants in the summit region were started from seedlings 100 years ago by George Munro.

Over the years ungulates—first sheep, then goats and cattle—eroded gullies and damaged this watershed. In recent years, axis deer have begun chewing on saplings, rubbing away bark on older trees, and grazing on grass and shrubs that would otherwise help hold the soil.

Realizing the importance of the watershed to the island of Lana'i, Castle & Cooke, in partnership with the Service, NRCS, DLNR and other agencies discussed above, has embarked on a 10-year program to rebuild the forest, restore the watershed, and protect native plants and their habitats. The cost is estimated at about $1.5 million over 10 years, half of which is to be provided by the Federal and State agencies and half by Castle & Cooke. The plan is to (1) fence off 3,580 acres at Lana'ihale summit in three sections; (2) conduct a public hunt to rid each area of axis deer; and (3) plant native plants and thousands of trees.

5.c. National Tropical Botanical Gardens

The National Tropical Botanical Garden (NTBG) is dedicated to the conservation of tropical plant diversity, particularly rare and endangered species. Within Maui County, the NTBG operates one garden on Maui.

The 122-acre Kahanu Garden is on the Hana coast along the far eastern shores of Maui. Concentrating on plants of value to the people of Polynesia, Micronesia and Melanesia, Kahanu

Garden has the world's largest collection of breadfruit and also contains the massive Pi'ilanihale Heiau, which is believed to be the largest ancient place of worship in Polynesia. The garden is surrounded by an expansive native pandanus forest.

5.d Kaho'olawe: Kaho'olawe Island Reserve

Used as a bomb target by the U.S. Department of Defense (DoD) for many years, the management and use of Kaho'olawe has changed significantly in the recent past. In late 1990, DoD stopped using Kaho'olawe for bombing and target practice. Further, the U.S. Navy has cleared 10,000 acres of surface ordnance and eradicated the population of introduced goats. Also, soil conservation and revegetation programs were instituted to restore and revive the environment. In 1993, the Hawai'i State Legislature established the Kaho'olawe Island Reserve to protect the entire island and surrounding coastal waters extending two miles seaward, and established the Kaho'olawe Island Reserve Commission (KIRC) under Native Hawaiian control to manage the island. In 1994, the U.S. Navy signed a deed returning Kaho'olawe to Hawai'i.

By Hawai'i law, the Kaho'olawe Island Reserve is to be used solely and exclusively, in perpetuity, for: (1) the preservation and practice of all rights customarily and traditionally exercised by Native Hawaiians for cultural, spiritual, and subsistence purposes; (2) the preservation and protection of the Reserve's archaeological, historical, and environmental resources; (3) rehabilitation, revegetation, habitat restoration, and preservation; and (4) education. Commercial uses are strictly prohibited in the Reserve.

Congress authorized $400 million to clean the island and restore its cultural and natural resources. The entire island is being cleared of surface ordnance to be reasonably safe for human access. Selected areas will be cleared for specific uses including revegetation with native species, trails and roads, cultural sites, camping areas, and educational facilities.

The U.S. Navy is consulting with the Service under section 7 of the Act to ensure the protection of threatened and endangered species during the ordnance clearing activities. However, the KIRC's 1998 environmental restoration plan for Kaho'olawe does not address specific management actions to protect and conserve endangered plant species.

APPROACH TO THE ECONOMIC IMPACT ANALYSIS[15] CHAPTER V

This chapter presents the approach used in Chapter VI to estimate the economic impacts of the section 7 listing and critical habitat provisions of the Act on projects, land uses and activities in proposed critical habitat for particular species. First, the scope of the economic analysis is described. This is followed by a discussion of the analytical concepts and steps used to conduct the analysis.

1. SCOPE OF THE ANALYSIS

The parameters below define the scope of the economic analysis.

1.a. Time Horizon for the Analysis

A 10-year time horizon is used because many landowners and managers do not have specific plans for projects beyond 10 years. In addition, the forecasts in this analysis of future economic activity are based on current socioeconomic trends and the current level of technology, both of which are likely to change over the long term.

1.b. Projects, Land Uses and Activities Subject to Analysis

The analysis focuses primarily on the "reasonably foreseeable" projects, land uses, and activities that could affect the physical and biological features of the proposed critical habitat units. In turn, these are the activities that could be affected by the critical habitat designation.

"Reasonably foreseeable" projects, land uses, and activities are defined for the purposes of this report as those which are (1) currently authorized, permitted, or funded; (2) proposed in plans currently available to the public; or (3) projected or likely to occur within the next 10 years based on (a) recent economic or land-use trends, development patterns, evolving technologies, competitive advantages, etc., and (b) limits imposed by land-use controls, access, terrain, infrastructure, and other restrictions on development. Current and future activities that could potentially result in section 7 consultations and/or project modifications are considered to be reasonably foreseeable.

[15] **Note to Reader:** Readers who are already familiar with the approach to the analysis may wish to skip this chapter and proceed to the economic analysis in Chapter VI.

2. ANALYTICAL CONCEPTS AND STEPS

The approach used to estimate the economic impacts on specific projects, land uses and activities in areas proposed for critical habitat involved, as appropriate, the analytical concepts and steps described below.

2.a. Background Information

In order to provide context for the analysis, and to the extent that information was reasonably available, background information was obtained on projects, land uses, and activities that may potentially be affected by the proposed designation. Depending upon the situation, this background information included some or all of the following: (1) the location of a project, land use, or activity; (2) a description of the project, land use, or activity, including its magnitude; (3) the amount of economic activity associated with the project, land use, or activity (e.g., revenues and employment); (4) past section 7 consultations, project modifications and associated costs; and (5) whether the project site is within the geographic area known to be *occupied* by listed species other than those in the current proposal.

2.b. *Federal Involvement*

For the current and planned projects, land uses, and activities that may affect the physical and biological features of the proposed critical habitat units, the next step in the analysis was to determine *Federal involvement.* As discussed in Chapter III, Federal agencies must consult with the Service whenever an activity they fund, authorize, or carry out may affect designated critical habitat. When consultations concern an activity on Federal lands, the relevant Federal agency consults with the Service. When consultations involve an activity proposed by a State or local government or by a private entity, the Federal "Action agency" to the activity consults with the Service.

Activities on State, county, municipal and private lands that do not have a *Federal nexus* (i.e., they do not involve Federal funding, a Federal permit, or other Federal actions) are not restricted by critical habitat designation. Therefore, these activities were not addressed further in the analysis.

In practice, not every single project, land use, and activity that has a *Federal nexus* has been subject to section 7 consultation with the Service. Thus, the analysis was further confined to those projects, land uses, and activities which are, in practice, likely to be subject to consultation. This assessment was based on a review of past consultations, current practices, and the professional judgments of Service and other Federal agency staff.

2.c. Exclusion of Man-made Features and Structures

In practice, the critical habitat provisions of section 7 do not apply to the operation and maintenance (O&M) of existing man-made features and structures because these features and structures normally do not contain, and are not likely to develop, any *primary constituent elements.* Examples of man-made features and structures include buildings, roads, aqueducts, telecommunications equipment, arboreta and gardens, and *heiau* (indigenous places of worship or shrines). As a result, O&M of man-made features and structures were not considered further in the analysis.

An equivalent interpretation is that existing man-made features and structures are unmapped holes that are within the boundaries of a critical habitat unit, but are not part of the unit.

2.d. Existing Protections

The next step in the analysis involved identifying the impacts on activities that were expected to result from existing protections unrelated to section 7 (e.g., other existing Federal, State, and county land-use controls and environmental protections). If some other existing statute, regulation, or policy limits or prohibits a project, land use, or activity, the economic impacts associated with those limitations or prohibitions are not attributable to section 7 listing provisions and/or critical habitat provisions. For example, State protections include land-use restrictions for activities in the State Conservation District and specific protections of threatened and endangered species and their ecosystems.

2.e. Consultations and Project Modifications

For current and planned projects, land uses, and activities that are likely to be subject to consultations under section 7 of the Act, the next step in the analysis was to estimate (1) the quantity and nature of the consultations (e.g., formal or informal); and (2) changes that are likely to occur in such items as project designs, schedules, land uses, activities and programs.

The estimates reflect the availability of information which, in many cases, was limited (e.g., the outcome of future consultations will not be known until they occur).

2.f. Economic Costs

The next step in the analysis was to estimate the costs of consultations and the changes to projects, land uses and activities prompted by implementing the section 7 provisions. The types of economic costs that were considered included, but were not limited to, changes in revenues, costs, and property values. The analysis then determined what proportion of those section 7-related costs were attributable solely to the critical habitat provisions of section 7 (as opposed to the listing provisions).

2.g. Qualitative Impacts

In some cases, costs were described but were not quantified for one or more of the following reasons: (1) the economic impacts attributable to both the species listing and the critical habitat are expected to be small; (2) the probability that the impacts will occur is small; (3) the impacts are highly speculative; or (4) data needed to quantify impacts are not reasonably available.

2.h. Economic Benefits

The final step in the analysis was to estimate the benefits (e.g., species preservation) associated with the section 7 listing and critical habitat provisions. In most cases, a qualitative discussion of benefits is provided because market prices or existing economic studies on which to base values are not available (e.g., the economic value of preserving certain species).

3. SOURCES OF INFORMATION

The approach described above relied primarily on information provided by the Service (GIS map overlays, acreage tables, public testimony and comment letters on prior critical habitat proposals, etc.); the State Department of Land and Natural Resources (DLNR); the State Department of Business, Economic Development & Tourism (DBEDT); county planning and finance departments; other Federal, State and county agencies; the private landowner and land managers; affected companies; and other interested parties. Public documents used included the proposed rule (including the preamble), *Hawai'i Revised Statutes* and *Hawai'i Administrative Rules* related to land use, *The State of Hawai'i Data Book,* applicable county land-use plans, and property tax data.

ECONOMIC COSTS AND BENEFITS **CHAPTER VI**

1. INTRODUCTION

As noted in the Preface, the Service may exclude an area from critical habitat designation if it determines that the benefits of excluding the area outweigh the benefits of inclusion. To aid in this determination, this chapter presents an analysis of the section 7-related economic costs and benefits associated with listing the plants as threatened and endangered species and with designating critical habitat for the plants. However, the Service cannot exclude an area if it determines that the exclusion will result in the extinction of the species.

As explained in Chapter V, the approach used in this economic analysis involves estimating both (1) the total section 7-related economic costs and benefits (also referred to as economic impacts) of the plant listings and critical habitat designation, and (2) the subset of these costs and benefits that is solely attributable to critical habitat designation. As a result, for each potential impact, the analysis presents two estimates:

— **Total Section 7 Costs and Benefits.** These estimates include the economic impacts likely to occur from implementing both the species listing provision and the critical habitat provision of section 7 of the Act.

— **Costs and Benefits Attributable to Critical Habitat.** These estimates represent those portions of the section 7-related economic impacts that are most likely attributable to the proposed critical habitat designation but not to the plant listings.

The discussion and analysis of costs and benefits in this chapter is divided into the following sections: section 7 consultation history and typical costs (Section 2), direct section 7-related costs (Section 3), indirect costs (Section 4), potential impacts on small entities (Section 5), and section 7-related economic benefits (Section 6). A summary of the direct and indirect costs and benefits is given in Section 7. For some land-use activities and projects, the designation of critical habitat may generate both direct and indirect costs, or both costs and benefits, etc. As a result, the analysis of economic impacts for some land-use activities and projects is split among two or more sections, as appropriate.

2. SECTION 7 CONSULTATIONS, SURVEYS AND PROJECT MODIFICATIONS

In order to provide a context for the analysis in Section 3 below, this section gives a summary of the past consultations and project modifications that concerned one or more of the listed plants.

It also presents the costs generally associated with section 7 consultations, biological surveys and associated project modifications. This information is used in Section 3 below to estimate future section 7-related economic impacts.

2.a. History of Section 7 Consultations and Project Modifications

Service records indicate that from the time the plants were listed between 1991 and 1999 until critical habitat was proposed, the Service conducted several informal but no formal section 7 consultations regarding activities in the proposed critical habitat. Only three of these informal consultations addressed activities occurring within the proposed critical habitat:

— In March 1995, the Service conducted an internal consultation regarding Federal Aid in Wildlife Restoration (commonly known as Pittman-Robertson) funding for a series of Department of Land and Natural Resources (DLNR) projects Statewide. The Service approved with some modification the game management projects proposed by DLNR. Appendix VI-A presents a discussion of the outcome of this consultation.

— In August 1997, the U.S. Navy initiated an informal consultation regarding a Proposed Marine Corps Training Area (PMTA) on privately-owned leased land in west Moloka'i. The area, overlapping with proposed critical habitat Units A1 and A2, contained four listed plant species. Even with the implementation of mitigation measures such as regular monitoring, designation of buffer zones, and the development of a Fire Management Plan, the Service determined that impacts to federally listed plants would be minimized but could not be completely avoided. Therefore, the Service recommended initiation of formal section 7 consultation. No formal consultation was subsequently initiated.

— In March 2001, the Service completed an internal informal consultation regarding Pittman-Robertson funding for a series of DLNR projects on Moloka'i. The Service approved with some modification 65 of 67 game-management projects Statewide proposed by DLNR, some of which were planned in the proposed critical habitat. Appendix VI-A presents a discussion of the outcome of this consultation.

In addition, the Service has conducted several internal consultations regarding Service-funded conservation projects within the proposed critical habitat.

The small number and informal nature of these consultations primarily reflect a lack of economic activity with *Federal involvement* in the areas proposed for critical habitat.

2.b. Cost of a Typical Section 7 Consultation, Biological Survey and Project Modification

2.b.(1) Focus of Consultation

For the plants, the proposed rule indicates that future section 7 consultations are likely to focus on projects and activities that could directly or indirectly adversely affect critical habitat, including:

— Activities that appreciably degrade or destroy the *primary constituent elements* for the plants including the following: overgrazing; maintaining feral ungulate levels; clearing or cutting native live trees and shrubs (e.g., woodcutting, bulldozing, construction, road building, mining, herbicide application); introducing or enabling the spread of non-native species; taking actions that pose a risk of fire, etc.

— Activities that alter watershed characteristics in ways that would appreciably reduce groundwater recharge or alter natural, wetland, or vegetative communities. Such activities include new water diversion or impoundment, excess groundwater pumping, and manipulation of vegetation through activities such as the ones mentioned above.

— Rural residential construction that includes concrete pads for foundations and installing septic systems.

— Recreational activities that appreciably degrade vegetation.

— Mining sand or other minerals.

— Introducing or encouraging the spread of non-native plant species.

— Importing non-native species for research, agriculture, and aquaculture, and releasing biological control agents.

2.b.(2) Cost of Consultation

As discussed in Chapter III, participants in a consultation may include the Service, the Federal Applicant or Federal Action agency, and possibly a non-Federal applicant. Although the Service does not charge fees for its consultations, participants in consultations normally spend time assembling information about the site and their proposed project or activity; preparing for one or more meetings; participating in meetings; arranging for biological surveys and any associated reports; and responding to correspondence and phone calls.

For three levels of complexity (Low, Medium or High), Table VI-1 gives the estimated cost to those participating in consultations with the Service. The estimate is based on: (1) a review of consultation records across the country related to other critical habitat rulemakings; (2) the typical amount of time spent by all participants; and (3) the relevant standard hourly rates and overhead allowances for the Service, other Federal agencies, and private applicants in Hawai‘i.

Table VI-I

ESTIMATED COST OF A SECTION 7 CONSULTATION

Item	Low	Medium	High
Consultation			
Federal Action Agency or Federal Applicant	$2,200	$6,400	$10,700
U.S. Fish and Wildlife Service	$1,600	$5,100	$10,000
Total for Federal Agencies	**$3,800**	**$11,500**	**$20,700**
Non-Federal Applicant (if any)	$1,400	$4,200	$8,200
Total (if a Non-Federal Applicant)	**$5,200**	**$15,700**	**$28,900**

Source: Project consultants and U.S. Office of Personnel Management, 2002 General Schedule Salary Table

As indicated in the table, consultation costs could range from as little as $3,800 to as much as $20,700 if just Federal agencies are involved, and from $5,200 to $28,900 if there is a non-Federal applicant.

2.b.(3) Cost of Biological Survey

The cost of a biological survey for a particular piece of land and a technical report on the findings varies according to a number of parameters:

— Size of the land area: The consultation history for a variety of listed plants suggests that projects are of three sizes: small (fewer than 10 acres), medium (11-100 acres), or large (101-500 acres). Large land areas take longer to survey and thus are more costly to survey.

— Ease of access to the site: Some sites can be reached easily while others can be reached only by helicopter. More remote sites are more costly to survey.

— Type of ecosystem: Forested areas are more difficult to survey than open areas and therefore are more costly to survey.

Based on these parameters, Table VI-2 presents estimates of the cost to survey land areas with different combinations of features and to prepare the report on the findings. The estimates assume the following: (1) a three-person team can survey 100 acres in one day if the area is open, and 30 acres if it is forested; (2) sites having "easy" access can be reached in an hour of driving or hiking, "medium" access takes 2 hours, and "difficult" access takes a half-hour by helicopter; (3) biologist and field-assistant services are $50 to $80 per hour; (4) travel costs for the survey team are $1,000 to $1,500 for round-trip airfare from O‘ahu, car rental, and per diem; and (5) helicopter time is $700 per hour.

Table VI-2

ESTIMATED COST OF BIOLOGICAL SURVEYS FOR THREATENED AND ENDANGERED PLANTS

Size and Location	Accessibility		
	Easy	**Medium**	**Difficult**
10 Acres, Open or Forested Area	$3,700	$3,900	$5,100
100 Acres, Open Area	$4,500	$4,900	$5,900
100 Acres, Forested Area	$10,200	$11,400	$14,900
500 Acres, Open Area	$15,900	$17,700	$22,900
500 Acres, Forested Area	$44,600	$50,600	$67,900

Source: Project consultants. Based on discussions with a Hawai'i-based biological consulting firm in 2002.

As Table VI-2 indicates, the costs of a biological survey could range from as little as $3,700 in a 10-acre, easily accessible, open area to as much as $67,900 in a 500-acre, remote, forested area. The estimates are based on average projects of each type; specific projects of each type may require more or less survey effort than the average used in the cost estimates, depending on the characteristics.

2.b.(4) Costs of Project Modifications

As discussed in Section 2.a above, no formal consultations regarding the listed plants have yet occurred, and the informal consultations did not result in significant project modifications. Thus, this analysis does not determine the cost of a typical project modification. Instead, project modification costs are determined on a project-by-project basis in Section 3 below.

3. DIRECT SECTION 7-RELATED COSTS

The following analysis of direct section 7-related costs addresses ongoing land-use activities in the proposed critical habitat, but excludes certain areas and man-made features and structures that are not considered to be part of the proposed critical habitat because they do not contain the *primary constituent elements* of listed plants (see Chapter I). The analysis also addresses foreseeable developments and major land-use changes in the proposed critical habitat.

3.a Management of Game Hunting

Presented below is an analysis of the direct economic impacts of the proposed critical habitat designation on the management of game hunting on State lands. Additional impacts are addressed

in Section 4, "Indirect Costs," while Appendices VI-A and VI-B provide background information on hunting and game-mammal management.

3.a.(1) Affected Hunting Acreage

Portions of four of the 10 proposed critical habitat units overlap with State-managed hunting lands:

— Unit A2 contains a small portion of State Hunting Unit C.

— Unit B1 contains all of State Hunting Unit N6 (Pu'u Ali'i NAR), and portions of State Hunting Units C and D.

— Unit C contains all of State Hunting Unit N5 (Olokui NAR) and much of State Hunting Unit B.

— Unit F contains portions of State Hunting Units B and D and all of State Hunting Unit E.

These overlapping areas represent approximately 14,500 acres, or 75 percent of the total State-managed Hunting Units on Moloka'i.

Additional private lands on Moloka'i are available for game hunting, though not managed by DLNR as State Hunting Units. However, public access to private lands is limited and subject to change, based on landowners' actions.

3.a.(2) Direct Economic Impacts on Game-Management Projects

Potential Project or Activity, Next 10 Years: Game management and hunting-related projects.

Based on a Statewide consultation on hunting in 2001 (see Appendix VI-A), these projects may include maintenance or construction of a hunter check-in station and game mammal surveys. Fencing or installation of covers on existing game bird watering units has been completed.

Federal Involvement: Federal cost-sharing of many DLNR game-management projects.

The *Federal nexus* is the Federal funding provided by the Service to DLNR to restore and rehabilitate wildlife habitat and to support wildlife management research. The funding is provided as part of the Pittman-Robertson Act (see Appendix VI-A, Section 7).

Presence of Other Listed Species: Non-plant listed species are found in two of the proposed critical habitat units that also overlap with portions of State Hunting Units.

Other Land Management: All of the State hunting areas in the proposed critical habitat are also in Forest Reserves or NARs. (See Table I-1).

Consultation and Costs:

- Total Section 7 Costs: $770 to $12,650

Consultations involving DLNR will be required on game-management projects that are partially funded under the Pittman-Robertson Act and which affect listed species or critical habitat. No consultations are required for Pittman-Robertson projects that do not affect listed species or their habitats; projects that are entirely funded by the State (even if they do affect listed species or their habitats); or projects by private parties on privately-owned land.

Because of the *Federal nexus* and the presence of listed plants (and wildlife) throughout much of the State hunting lands, internal Service consultations already take place on game-management projects that are partially funded under the Pittman-Robertson Act. However, if the proposed critical habitat is designated, the scope of future section 7 consultations will be expanded to include portions of the critical habitat where no listed species are present. The main issue for the consultation is likely to be the impact of ungulate activity on listed plants and their habitat.

Statewide consultations between DLNR and the Service occur every five years, and the last consultation took place in 2001. Therefore, two programmatic consultations are likely over the next 10 years. The 2001 consultation cost the Service and DLNR approximately $27,600. The cost was high because new issues were raised. Without critical habitat designation, information from the Service and DLNR suggests that the next two consultations would have each cost about 50 to 75 percent of the 2001 consultation, or about $13,800 to $20,700 Statewide. Thus, two consultations over the next 10 years would have a total Statewide cost of about $27,600 to $41,400.

Many of the projects proposed for Pittman-Robertson funding apply to all six islands. Thus, by allocating the portion of consultation costs attributable to each island equally, Moloka‘i’s share over the next 10 years would be $4,600 to $6,900 ($27,600 x 1/6; $41,400 x 1/6). Alternatively, two percent of the State’s hunting areas are located on Moloka‘i. Assuming consultation costs were incurred in relation to acreage, Moloka‘i’s share of consultation costs over the next 10 years would be $550 to $830 ($27,600 x 2%; $41,400 x 2%). Using these two methods to allocate Moloka‘i’s share of the consultation costs, a conservative estimate over the next 10 years would be $550 to $6,900.

However, future consultations may address areas that have not been considered before critical habitat designation. Given the fact that no plant-related critical habitat consultations have taken place in Hawai'i, no estimates are available for the cost increase associated with the designation. However, it is likely that while future consultations will involve a much larger area, they likely will address about the same number of game-management projects, involve about the same number of staff, and involve staff who are already familiar with the issues. Given these factors, the increase in costs is estimated at 20 to 50 percent. This increases the 10-year consultation cost to between $660 and $10,350.

Also, the 2001 consultation on Pittman-Robertson funding may be reinitiated due to critical habitat designation. Since the issues relating to Moloka‘i were resolved in the original consultation, the reinitiation is likely to involve a low level of effort. Similar to the above, the assumed cost is 20 to 50 percent of the initial cost of $27,600. Depending on the method of allocation, Moloka‘i’s share of the 2001 consultation costs was between $550 to $4,600. ($27,600 x 2%; $27,600 x 1/6). About 20 to 50 percent of this amount is $110 to $2,300.

Thus, the total projected consultation costs for Moloka‘i over the next 10 years are $770 to $12,650.

All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Costs Attributable to Critical Habitat: $220 to $5,750

Without the critical habitat designation, consultation costs are estimated at $550 to $6,900 (see above). Thus, any additional amount would be attributable to critical habitat.

Anticipated Project Modification and Costs:

- Total Section 7 Costs: $17,600 to $148,000

Moloka'i does not have any State hunting areas that are managed to maintain or enhance game mammal populations and only two percent of the State's hunting areas are located on Moloka'i. As such, of all the management activities DLNR conducts with Pittman-Robertson funding, only a few affect Moloka'i. As a result, project modifications on Moloka'i have been fairly minor, and have historically included the fencing or covering of game bird watering units to prevent their use by game mammals, a modification which is largely completed for existing units. For the most part, DLNR can avoid costly project modifications by using Pittman-Robertson funds for game management projects that do not adversely affect listed species or their habitat and, if needed, use only State funds on projects that the Service believes could have adverse impacts. By doing this a *Federal nexus* is avoided. Thus, project-modification costs are expected to be modest.

On the other hand, under this strategy DLNR will have to find sources of funding other than Federal monies for those projects that could adversely affect critical habitat. It is likely that DLNR will simply use funds previously allocated to other game management projects. For example, the 2001 consultation resulted in funds being expended to prevent game mammals from using game-bird watering stations at an average cost of about $1,000 each.

Over the next two consultations, absent critical habitat designation, the costs of project modifications are expected to be similar to the 2001 costs, or about $110,000 Statewide for each consultation. Depending on the method of allocation, over the 10-year period, the Moloka'i share would be between $4,400 and $37,000 (2 x $110,000 x 2%; 2 x $110,000 x 1/6).

However, because future consultations will address areas that were not typically considered before critical habitat designation, this may result in project modifications to cover the additional areas. As noted earlier, no previous plant-related critical habitat consultations exist from which to estimate the increase in project modification costs. Therefore, absent such information, this analysis makes the conservative assumption that the cost of past project modifications only addresses the part of the hunting units that overlaps with the *occupied* proposed critical habitat. Of the approximately 14,500 acres of hunting land proposed for critical habitat designation, about 3,600 acres (25 percent) are considered *occupied* by listed plant populations. Therefore, because future project modifications may be required in an area four times the size of that at present, the estimated costs associated with the future project modifications are between $17,600 and $148,000 for the 10-year period.

- Costs Attributable to Critical Habitat: $13,200 to $111,000

Without the critical habitat designation, project modification costs are estimated at $4,400 to $37,000 (see above). Thus, any additional amount would be attributable to critical habitat.

3.b. National Parks

3.b.(1) National Historical Parks Included Within Proposed Critical Habitat

Most of Kalaupapa National Historical Park is located within proposed critical habitat (portions of Units A2, B1 and B2). Though located on State land, the Park is managed by the National Park Service (NPS) under a cooperative agreement with several State agencies, including the State Department of Health and DLNR. Although the primary resource management emphasis of NPS at Kalaupapa is preservation of the historic settlement structures of the former Hansen's Disease patients, resource management objectives also recognize the Park's inherent scenic, geologic, biotic and archaeological resources.

Human occupation at Kalaupapa extends from as early as 1000 A.D., and the number and types of archaeological resources and their state of preservation make Kalaupapa one of the most valuable archaeological preserves in Hawai'i. An assessment of sites is to be conducted this summer (2002) and is expected to provide more information on the number and condition of existing sites. Management of the natural resources concentrates recovery and restoration efforts on areas of special ecological value - those determined to be the most intact, diverse, unique and manageable sites within the Park. These management efforts include constructing fencing and ungulate removal.

As mentioned in Chapter I, Section 2, the developed settlement area of Kalaupapa, the churches and structures at the prior settlement of Kalawao, and the Moloka'i Lighthouse do not contain the *primary constituent elements* for plants and are excluded from the critical habitat. Thus, planned preservation projects and improvements limited to these portions of Kalaupapa National Historical Park will not be affected by the proposed critical habitat designation.

Moreover, operation and maintenance of existing man-made features are not subject to section 7 consultation. This would include preservation and restoration efforts of culturally or archaeologically significant sites that may occur based on the results of this summer's assessment.

However, based on discussions with Park managers, the following projects may occur in portions of Kalaupapa National Historical Park that do contain the *primary constituent elements* for plants and are included in critical habitat: (1) installation of fencing in approximately three different locations in the next 10 years to exclude ungulates, and (2) the possible relocation of an existing landfill. These projects may fall within Units A2 or B1.

3.b.(1)(A) Installation of Fencing

Pu'u Ali'i NAR is located within the Park boundaries on a plateau in the Moloka'i mountains above Kalaupapa Peninsula. Installation of fencing within Pu'u Ali'i NAR to exclude ungulates is in the planning phase in cooperation with the State of Hawai'i. In addition, over the next 10 years, NPS estimates that another two fences in as-yet undetermined locations may be constructed within the Park boundaries to support ecological restoration efforts.

Potential Project or Activity, Next 10 Years: Installation of fencing

Federal Involvement: (1) The Park is managed, operated and funded by NPS; (2) the Park is listed on the National Register of Historic Places as a national historic landmark; and (3) a section of the Park is within the North Shore Cliffs National Natural Landmark.

Other Land Management: The Kalaupapa Peninsula is primarily within the Agricultural District, while the coastline, the cliffs, and the plateau above Kalaupapa are in the Conservation District. (See Table I-1).

Consultations and Costs

- Total Section 7 Costs: $15,600

Estimate is based on the following: (1) one consultation for each of the three federally-initiated fencing projects, (2) Low cost from Table VI-1 of a consultation with a Federal agency as the Applicant and the involvement of a non-Federal agency (i.e., $5,200), and (3) no biological survey because of the beneficial nature of the project. While the consultations may not necessarily involve non-Federal agencies, this analysis conservatively assumes that the State may be involved in each consultation given that the Park is located on State land.

- Cost Attributable to Critical Habitat: $15,600

There is no history of NPS consulting with the Service regarding the listed plants, so all of the consultation costs are conservatively attributed to critical habitat. However, NPS does indicate that it works informally with the Service during the planning and development of conservation and other projects that may have an impact on listed species or on the general environment.

Anticipated Project Modifications and Costs: Minor

Because the mission of NPS is to preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations and because of the beneficial nature of fencing projects, it is unlikely that proposed activities to install fencing would adversely affect the listed plants.

3.b.(1)(B) Relocation of Existing Landfill

Relocation of the existing landfill is under consideration to allow greater Park control over the disposal of its waste and to allow the introduction of additional recycling efforts. Activities associated with landfill relocation may include closure of the existing landfill, removal and transport of existing refuse, and preparation of the new site, which may include excavation and earth movement. While plans for this project have not yet been developed and while it is likely that the landfill would be located within the settled area of Kalaupapa, an area excluded from the critical habitat (as noted in Chapter I, Section 2), consultation costs associated with this project are nonetheless conservatively included in this analysis.

Potential Project or Activity, Next 10 Years: Relocation of existing landfill

Federal Involvement: The Park is managed, operated and funded by NPS.

Other Land Management: The Kalaupapa Peninsula is primarily within the Agricultural District, while the coastline, the cliffs, and the plateau above Kalaupapa are in the Conservation District. (See Table I-1).

Consultations and Costs

- Total Section 7 Costs: $8,900 to $19,400

Estimate is based on the following: (1) one consultation for a federally-initiated landfill project, (2) Low to Medium cost from Table VI-1 of a consultation with a Federal agency as the Applicant and the involvement of a non-Federal agency (i.e., $5,200 to $15,700), and (3) one biological survey of a 10-acre open area with easy access. While the consultations may not necessarily involve non-Federal agencies, this analysis conservatively assumes that the State may be involved in each consultation given that the Park is located on State land.

- Cost Attributable to Critical Habitat: $8,900 to $19,400

There is no history of NPS consulting with the Service regarding the listed plants on Moloka'i, so all of the consultation costs are conservatively attributed to critical habitat. However, NPS does indicate that it informally works with the Service during the planning and development of conservation and other projects that may have an impact on listed species or on the general environment.

Anticipated Project Modifications and Costs: Minor

Since the mission of NPS is to preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations, it is unlikely that proposed activities to relocate the existing landfill will affect the listed plants. If a listed plant population is found in the vicinity of the selected relocation site, the project may have to be modified. One modification would be to move the site far enough away from the plant population so that construction will not affect it. If the siting change is made early in the process, then the cost of moving the site could be negligible. Because (1) the landfill is still under initial consideration; (2) Kalaupapa has a population of only 150 people, thus limiting the size of the landfill needed; and (3) the settled portion of Kalaupapa (an area excluded from the critical habitat) is the most likely site, the project modification costs associated with this possible project are anticipated to be minor.

3.b.(2) Establishment of New National Parks Within Proposed Critical Habitat

In 1998, U.S. Representative Patsy Mink (D-HI) introduced legislation that called for a study of five areas on Maui, Moloka'i, Lana'i and Kaua'i as possible National Parks. The study, completed in November 2000, found two areas on Moloka'i (Halawa Valley and the north shore sea cliffs) as suitable for inclusion in the national park system due to the national significance of their natural and cultural resources. Proposed critical habitat units B1, C and D overlap with the north shore sea cliffs study area.

However, in August 2001, after community members objected to National Park status based on concerns about potential restrictions on access and impacts on resident lifestyles caused by increased visitor numbers, Representative Mink and officials with NPS stated that they would not pursue park plans unless the Moloka'i community changed its mind.

Given the complexity involved in becoming a National Park and the lack of community support for the creation of new National Parks on Moloka'i, this analysis concludes that it is unlikely that areas within the proposed critical habitat will become National Parks within the next 10 years.

Therefore, no consultation costs or project modifications involved in such a proposal have been included in this analysis.

3.c. Conservation Projects

3.c.(1) East Moloka‘i Watershed Partnership (Watershed Partnership Program)

As noted in Chapter IV Section 5, the East Moloka‘i Watershed Partnership (EMWP) was established in November 1999 to implement a watershed management program to maintain and increase the watershed capacity and to decrease erosion. Approximately 3,457 acres managed under this program fall within proposed critical habitat Units C, F and G. The partnership’s first project was to construct a 5.5-mile contour fence at an elevation of 3,500 feet to keep ungulates out of the upper forest, using crews hired by The Nature Conservancy’s Moloka‘i Program. Additional watershed management activities, including extension of fencing, are possible in the next 10 years. Initial EMWP funding has come from a variety of sources, including the Service, U.S. Department of Agriculture (USDA) (Enterprise Community funding), Environmental Protection Agency (EPA), State Department of Health, Maui County, Maui Board of Water Supply, Natural Resources and Conservation Service (NRCS), and the Nature Conservancy.

While the EMWP would like to provide support for management activities on all the land within the watershed subject to erosion, the number of projects undertaken in the next 10 years is dependent on landowner willingness to participate in conservation projects. It is possible that the success of the existing management agreement may encourage the participation of more landowners. Based on the limited number of entities owning land within the watershed, however, this analysis estimates that at most three new consultations will occur in the next 10 years, resulting from federal funding of projects of new participants in the Watershed Partnership program. In addition, during the next 10 years, consultation may be reinitiated for the existing EMWP management agreement.

Potential Project or Activity, next 10 Years: Fencing projects, selected reforestation, feral ungulate control to protect and enhance watershed

Federal Involvement: Partial and/or entire funding provided by the Service and other federal agencies, including USDA, NRCS and EPA

Presence of Other Listed Species and Critical Habitat for Other Species: Possible, depending upon the location of the watershed management projects

Consultation and Costs

- Total Section 7 Costs: $5,200 to $65,500

No reinitiation will be required for the existing fencing, as once constructed it is a man-made feature and O&M of existing man-made features and structures is not subject to section 7 consultation. However, other planned watershed management activities, such as ungulate removal, conducted through the existing EMWP Agreement may need to be reviewed for their impact on critical habitat. Because the Service has already conducted a consultation for the existing EMWP activities, reinitiation of consultation, if any, will likely be non-substantive and require a low level of effort. The cost estimate is based on (1) reinitiation of consultation; (2) the Low cost from Table VI-1 of a consultation with a non-Federal agency as the Applicant; and (3) no biological surveys because the Service already conducted surveys during the initial consultation. Costs associated with reinitiation of consultation total $5,200.

For any new watershed partnership projects, the estimate is based on (1) zero to three separate consultations for federally-funded projects to implement watershed management plans; (2) Low cost from Table VI-1 of a consultation, with a non-Federal agency as the Applicant; and (3) one biological survey of a 100-acre forested area with moderate to difficult access for each of the three new projects. The Federal agencies involved in these consultations will depend on the source of funding and may include the EPA, USDA, as well as the Service. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present. Costs associated with consultations for new watershed partnership projects total $0 to $60,300.

- Cost Attributable to Critical Habitat: $5,200

As noted above, the Service has already conducted a consultation under the listing of the plants in the project area. Therefore, the cost associated with the reinitiation of this consultation is solely attributable to the designation of critical habitat.

For the potential new watershed projects, the watershed partnership area supports many threatened and endangered species and the Service has a history of conducting informal internal consultations when it provides funding for conservation projects. Thus, it is likely that the consultation would have occurred without the proposed critical habitat designation.

Anticipated Project Modifications and Costs: None

Since EMWP projects are designed to enhance the quality of the watershed, it is unlikely that proposed activities would adversely affect the plants for which critical habitat is being proposed. If any project modifications are involved, they are expected to be minor.

3.c.(2) Hui Malama o Mo‘omomi (Partners for Fish & Wildlife)

As discussed in Chapter IV, Section 1(c), the Partners for Fish and Wildlife Program provides technical and financial assistance for the restoration of natural biological communities, especially those containing long-term benefits to threatened, endangered or rare species. In 2001, this program provided funding to a non-profit grassroots organization called Hui Malama o Mo‘omomi, under a cooperative agreement, for coastal strand restoration. The project involves coastline in proposed critical habitat unit A2, on Department of Hawaiian Home Lands (DHHL) land

directly east of Mo'omomi Bay. The goal of the restoration project is to encourage revegetation of the natural biological community while protecting the existing rare, endangered, and threatened species in the area by limiting vehicular and pedestrian traffic. In the completed first phase of the project, a wooden fence was constructed adjacent to the existing DHHL pavilion to function as a windbreak, irrigation was installed and revegetation efforts begun. Hui Malama o Mo'omomi has a pending funding application to continue coastal strand restoration up to Anahaki Gulch, approximately one mile to the east. Future restoration efforts are slated to extend the area of the project to encompass the entire shoreline from Mo'omomi Bay to Kalaupapa, all of which falls within proposed critical habitat Unit A2.

Potential Project or Activity, next 10 Years: Fencing, irrigation, weeding, selected revegetation

Federal Involvement: Partial and/or entire funding by the Service, through the Partners for Fish and Wildlife Program

Presence of Other Listed Species and Critical Habitat for Other Species: Possible, depending upon the location

Consultation and Costs

- Total Section 7 Costs: $5,200 to $10,400

Estimate based on (1) one consultation for the pending application for coastal strand restoration up to Anahaki Gulch and one potential reinitiation upon extension of the restoration project area, (2) Low cost from Table VI-1 of a consultation with a non-Federal organization as the Applicant, and (3) no biological survey due to the beneficial nature of the project and the existing information about the biology of the area. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: $1,000 to $5,700

The area targeted for coastal strand restoration supports many threatened and endangered species. The Service has a history of conducting informal internal consultations when it provides funding for conservation projects under the Partners for Fish and Wildlife Program. Service personnel and consultation histories suggest that habitat preservation considerations generally are taken into account in jeopardy-related section 7 consultations. While it is likely that consultations addressing habitat issues would have occurred without the proposed critical habitat designation, the cost of such consultations are likely to have been less than that undertaken with critical habitat in place because such consultations would have focused on the areas *occupied* by listed plant populations. For the pending coastal strand restoration up to Anahaki Gulch, since approximately 80 percent of the area from Mo'omomi Bay to Anahaki Gulch is considered *occupied* by listed plant populations, the estimated cost of consultation absent critical habitat designation for this project would be $4,200 ($5,200 x .80). The remainder, $1,000, would be attributable to critical habitat. If reinitiation occurs upon extension of the restoration project area, since approximately 10 percent of the area from Anahaki Gulch to Kalaupapa is considered *occupied* by listed plant populations, the estimated cost of this reinitiation absent critical habitat designation would be $500 ($5,200 x .10). The remainder, $4,700, would be attributable to critical habitat. Thus, if only restoration up to Anahaki Gulch occurs, the costs attributable to critical habitat would be $1,000 and if both restorations projects occur, then the costs attributable to critical habitat would be $5,700.

Anticipated Project Modifications and Costs: None

No project modifications are projected because of the beneficial nature of the restoration project and the role of the Service in funding the project. If any project modifications are involved, they are expected to be minor.

3.c.(3) Ilio Point (Coastal Program)

The Service's Coastal Program provides financial assistance for the restoration of coastal habitats. In 2002, this program provided funding to DLNR to replace approximately one mile of fencing to exclude deer and goats from the coastal area at Ilio Point. Ilio Point is located at the northwest tip of Moloka'i and is an area of significant cultural and biological value, containing evidence of Native Hawaiian habitation and several rare, threatened, or endangered plants. Now owned by the State, the area previously was utilized by the military for bombing exercises and likely contains unexploded ordnance. While an internal section 7 consultation has been completed, DLNR intends to hold public hearings on Moloka'i and complete an archaeological survey of the area before initiating construction on the project. After construction of fencing, future restorative efforts may include selected revegetation.

Potential Project or Activity, next 10 Years: Fencing and selected revegetation

Federal Involvement: Partial and/or entire funding by the Service, through the Coastal Program

Consultation and Costs

- Total Section 7 Costs: $5,200

The Service has already conducted consultations on the affected project. Therefore, reinitiation for additional restorative work will likely occur, but it probably will be non-substantive and require a low level of effort. Estimate based on (1) one reinitiation for additional restorative work at Ilio Point, (2) Low cost from Table VI-1 of a consultation with a non-Federal agency as the Applicant, and (3) no biological survey due to the beneficial nature of the project and the prior involvement of the Service at this location.

- Cost Attributable to Critical Habitat: $0

Ilio Point supports many threatened and endangered species and the entire area is considered *occupied* by listed plant populations. The Service has a history of conducting informal internal consultations when it provides funding for conservation projects under the Coastal Program, and Service personnel and consultation histories suggest that habitat preservation considerations generally are taken into account in jeopardy-related section 7 consultations. In addition, the ecology of the area is well known through prior consultations. Thus, it is likely that a consultation addressing habitat issues would have occurred without the proposed critical habitat designation, and that the cost of such a consultation would be comparable to that undertaken with critical habitat in place.

Anticipated Project Modifications and Costs: None

No project modifications are projected because of the beneficial nature of the restoration project and the role of the Service in funding the project. If any project modifications are involved, they are expected to be minor.

3.c.(4) Wildlife Habitat Incentives Program

As discussed in Chapter IV, Section 1(c), the Wildlife Habitat Incentives Program (WHIP) provides technical assistance and funding for landowners seeking to protect and restore Hawai'i's native habitats. NRCS estimates that in the past three years, there have been approximately nine WHIP-sponsored projects on Moloka'i. All but one, the East Moloka'i Watershed Partnership fencing project discussed above in Section 3.d.(1), appear to be located outside of the proposed critical habitat units. Using this information to forecast future WHIP projects in proposed critical habitat, between one and three new projects are likely within the proposed critical habitat in the next 10 years. While the costs associated with these projects may already be accounted for in Section 3.d(1), in the discussion on the East Moloka'i Watershed Partnership, this analysis makes the conservative assumption that these projects are separate and require their own consultation.

Potential Project or Activity, next 10 Years: Fencing, weeding, selected revegetation on private lands

Federal Involvement: Partial and/or entire funding by NRCS, through the USDA

Presence of Other Listed Species and Critical Habitat for Other Species: Possible, depending upon the location of the projects

Consultation and Costs

- Total Section 7 Costs: $5,200 to $47,100

Estimate based on (1) one to three consultations in the next 10 years, (2) Low to Medium cost from Table VI-1 of a consultation with a Federal agency as the Applicant and the involvement of a non-Federal entity (i.e., $5,200 to $15,700), and (3) no biological survey, because previous WHIP projects have not required biological surveys due to the beneficial nature of the project and the technical assistance provided by the Service during project development. All of the consultation costs are conservatively assigned to the plants, even though the consultation may also address listed wildlife species that may be present.

- Cost Attributable to Critical Habitat: $5,200 to $47,100

It is the current practice of NRCS to initiate consultation with the Service on all federally funded projects. Service personnel and consultation histories suggest that habitat preservation considerations generally are taken into account in jeopardy-related section 7 consultations. While it is likely that a consultation addressing habitat issues would have occurred without the proposed critical habitat designation, these consultations would have focused on areas *occupied* by listed plant populations. Because it is unknown the extent to which future WHIP projects will be sited in areas *occupied* by the listed plants, this analysis conservatively attributes all consultation costs to critical habitat.

Anticipated Project Modifications and Costs: None

No project modifications are projected because of the beneficial nature of WHIP projects and the potential involvement of the Service by providing technical assistance.

3.d. Agriculture and Ranching Operations

Approximately 14,786 acres of land of the proposed critical habitat are within the State Agricultural District, in Units A1, A2, B1, E1, E2, F and G. However, most of the Agricultural land in Unit A2 and B1 is under the management of NPS and is not used for farming or grazing.

3.d.(1) Pu‘u o Hoku Ranch (Units E1, E2)

Pu‘u o Hoku Ranch also owns thousands of acres on the east end of Moloka‘i, including the majority of the land within Units E1 and E2. On these lands, Pu‘u o Hoku conducts the following activities: cattle ranching, ecotourism (including providing guest accommodations, horseback riding, hiking and biking), recreational hunting, and cultivation of agricultural crops, including *‘awa*. In general, no consultations or project modifications involving these activities are anticipated because there is no *Federal involvement*.

However, ranching can have a *Federal nexus* if a rancher receives a loan from the Federal Farm Service Agency, or receives a small grant from the NRCS to voluntarily adopt environmentally friendly practices, either through the Environmental Quality Incentives Program (EQIP), the Conservation Reserve Program (CRP) (see Chapter IV), or the Forestry Incentives Program (FIP). Pu‘u o Hoku currently participates in all three programs, receiving funding yearly for activities such as fencing and manure/foliage analysis (EQIP), riparian vegetative planting (CRP) and reforestation (FIP) on their ranchlands. Because proposed Units E1 and E2 cover a significant portion of the land used for ranching, it is likely that the proposed critical habitat overlaps with the land subject to management practices instituted under one of these NRCS programs.

In addition, Pu‘u o Hoku Ranch currently has a Safe Harbor Agreement for the reintroduction of *nene* (Hawaiian goose) with the Service and DLNR. This Safe Harbor Agreement covers 735 acres near Cape Halawa on the east end of Moloka‘i and overlaps with a portion of proposed Unit E1. Under the Agreement, the Ranch is to maintain or improve significant amounts of *nene* habitat for a period of seven years by continuing cattle ranching operations, thereby maintaining open, short grass habitat.

Potential Project or Activity, Next 10 Years: Ranching, fencing, ecotourism, hunting farming

Federal Involvement: (1) For ranching and fencing only: Federal funding through NRCS; (2) Incidental *Take* permit pursuant to the Safe Harbor Agreement with the Service

Future Consultation Costs:

- Total Section 7 Costs: $15,300 to $25,800

There is no history of consultation for the existing NRCS projects at Pu‘u o Hoku. Therefore, consultation with NRCS will be necessary to ensure that continuation of the management practices supported by the EQIP, CRP and FIP programs do not adversely affect habitat critical for the recovery of the listed plants. The estimate of the costs associated with this consultation is based

on (1) one consultation, (2) Low to Medium cost from Table VI-1 of a consultation with a Federal agency as the Applicant and the involvement of a non-Federal entity, and (3) biological survey of a 100-acre open site with medium access. While funding is received under three separate NRCS programs, it is anticipated that only one consultation with NRCS is required because all three programs involve the same landowner and essentially the same piece of property. The combined total acreage for Units E1 and E2 is 1,136 acres, and it is conservatively estimated that half of the acreage is both within the proposed critical habitat and subject to land management practices instituted under one of the three NRCS programs. While a biological survey is likely to be necessary, because the Service already conducted surveys on a portion of this property during initial consultation for the Safe Harbor Agreement (see below), it is anticipated that a new survey will be required for approximately 100 acres. The total for consultation on existing NRCS projects is between $10,100 to $20,600.

Because the Safe Harbor Agreement was completed and signed before proposed critical habitat designations were proposed, reinitiation on the Safe Harbor Agreement will be required to determine if the Incidental *Take* permit for *nene* would adversely harm the listed plants. The estimate of the costs associated with this reinitiation is based on (1) one reinitiation, (2) Low cost from Table VI-1 of a consultation with a non-Federal agency as the Applicant, and (3) no biological survey because the Service already conducted surveys during the initial consultation for the Safe Harbor Agreement. The total for the Safe Harbor reinitiation is $5,200.

- Costs Attributable to Critical Habitat: $15,300 to $25,800

Since no listed plants species are known to exist in Units E1 or E2, all costs associated with a consultation relating to the existing NRCS programs are solely attributable to the designation of critical habitat. Furthermore, because the Service has already concluded its consultation related to the Safe Harbor Agreement, reinitiation would occur only because of the designation of a portion of the area covered by the Safe Harbor Agreement as critical habitat. Therefore, all costs associated with these two consultations are solely attributable to the designation of critical habitat.

Anticipated Project Modification and Costs:

- Total Section 7 Costs: $0 to $177,900

Because none of the 46 plants species occupy Units E1 or E2 and because projects sponsored by the NRCS programs are generally beneficial in nature, it is unlikely that continuation of these land management practices will adversely affect the listed plant species or their critical habitat. However, funding under the EQIP program is limited to $50,000 over the life of the contract. If significant project modifications were required, the landowner may decide to forego the EQIP funding and cancel the contract with NRCS rather than make modifications identified through the section 7 consultation process with the Service. This would remove the *Federal involvement.* Thus, $50,000 is the worst-case scenario of the costs of project modification for the EQIP project.

Similarly, funding through the CRP program is based on the agricultural value of the land. Landowners receive annual rental payments as well as cost-share assistance to establish the approved management practices. In 2001, the total CRP payment was approximately $2,790. Over the course of 10 years, this would total $27,900. A landowner could decide to forego CRP funding and cancel the CRP contract rather than make modifications identified through the section 7 consultation process with the Service. This would remove the *Federal involvement* in the ranching operations. An estimate of the worst-case scenario of the cost of project modifications for the CRP project is $27,900.

Finally, the FIP program provides cost-share assistance for tree planting, timber stand improvements, and related practices on private forest lands. The annual cost-share payment limit is $10,000. A landowner could decide to forego FIP funding and cancel the FIP contract rather than make modifications identified through the section 7 consultation process with the Service. This would remove the *Federal involvement* in the ranching operations. An estimate of the worst-case scenario of the cost of project modifications for the FIP project is $100,000 ($10,000 x 10 years)

Because none of the 46 plant species actually occupy Unit E1, it is unlikely that the provisions of the Safe Harbor Agreement will adversely affect the listed plant species. However, it is possible that there may be an adverse impact on the habitat critical to the recovery of the listed plant species. The landowner may decide to cancel the Safe Harbor Agreement rather than modifying it to address any impacts. This would remove the *Federal involvement*. While there is no monetary cost to the landowner associated with cancellation of the Safe Harbor Agreement, there is a societal and environmental cost associated with the cancellation of a Safe Harbor Agreement designed to assist another endangered species, the *nene*.

Thus, $177,900 ($50,000 + $27,900 +$100,000 + $0) is the worst-case scenario of the total costs of project modifications resulting from existing activities at Pu‘u o Hoku Ranch.

- Costs Attributable to Critical Habitat: $0 to $177,900

Since no listed plants species are known to exist in Units E1 or E2, all costs associated with project modifications resulting from consultations relating to existing NRCS programs are solely attributable to the designation of critical habitat. Furthermore, because the Service has already concluded its consultation related to the Safe Harbor Agreement, any project modifications resulting from reinitiation would occur only because of the designation of a portion of the area covered by the Safe Harbor Agreement as critical habitat. Therefore, all project modification costs are solely attributable to the designation of critical habitat.

3.d.(2) Other Ranching Operations (Units A1, A2, F, G)

The primary activity on the remaining agricultural land within the proposed critical habitat is grazing. As noted earlier, ranching can have a *Federal nexus* if a rancher receives a loan from the Federal Farm Service Agency, or receives a small grant from the NRCS to voluntarily adopt environmentally friendly practices, either through the Environmental Quality Incentives Program (EQIP) or the Conservation Reserve Program (CRP) (see Chapter IV). Otherwise, ranching on private lands has no *Federal nexus.*

The designation captures only a small fraction of the total amount of Agricultural District land on Moloka'i. Because competition for EQIP and CRP funding is keen among agricultural landowners on Moloka'i, it is estimated that one to two consultations due to Federal funding through NRCS will occur in the next 10 years (i.e., most of the funding likely will go to landowners outside of critical habitat simply because most of the agricultural land is outside of the designation).

Potential Project or Activity, Next 10 Years: Institution of environmentally friendly land use practices, including revegetation, creation of riparian buffers, construction of windbreaks, fencing, and noxious weed removal.

*Federal Involvemen*t: Funding by NRCS, through the USDA

Future Consultation Costs:

- Total Section 7 Costs: $9,700 to $41,200

Estimate based on (1) one to two consultations in the next 10 years, (2) Low to Medium cost from Table VI-1 of a consultation with a Federal agency as the Applicant and the involvement of a non-Federal entity, and (3) biological surveys of a 100-acre open site with easy to medium access.

- Costs Attributable to Critical Habitat: $9,700 to $41,200

There is no history of consultations before 2001 relating to EQIP or CRP contracts because previous projects did not affect the listed plants. While it is NRCS' current practice to consult on all federally funded projects, including EQIP and CRP contracts, this practice appears to have begun in anticipation of the proposals to designate critical habitat. Therefore, all consultation costs are conservatively attributed to critical habitat

Anticipated Project Modification and Costs:

- Total Section 7 Costs: $0 to $100,000

Funding under the EQIP program is limited to $50,000 over the life of the contract. If substantial project modifications are required, the landowner may decide to forego the EQIP funding and cancel the contract with NRCS rather than make modifications identified through the section 7 consultation process with the Service. This would remove the *Federal involvement* in the ranching operations. Thus, if both anticipated future projects were EQIP projects, $100,000 ($50,000 * 2) is the worst case scenario of the costs of project modification associated with EQIP projects.

Similarly, funding through the CRP program is based on the agricultural value of the land. Landowners receive annual rental payments as well as cost-share assistance to establish the approved management practices. A landowner could decide to forego CRP funding and cancel the CRP contract rather than make any substantial modifications that may be raised through the section 7 consultation process with the Service. This would remove the *Federal involvement* in the ranching operations. As calculated previously, an estimate of the worst-case scenario of the cost of project modifications for the existing CRP project on Moloka'i is $27,900). Assuming similar payments for future CRP projects, if both anticipated future projects were CRP projects, then $55,800 ($27,900 * 2) is the worst case scenario of the costs of project modification associated with CRP projects.

- Costs Attributable to Critical Habitat: $0 to $100,000

Because all consultation costs are conservatively attributed to critical habitat, the costs associated with any project modifications arising from these consultations are also attributed to critical habitat.

3.e. Residential Development

3.e.(1) Potential Development Within the Urban District

Only 178 acres of the proposed critical habitat is within the Urban District. All 178 of these acres are within Kalaupapa National Historical Park, part of the existing residential settlement of Kalaupapa, in proposed critical habitat unit A2. As mentioned in Chapter I Section 2, this developed area does not contain the *primary constituent elements* for plants and is excluded from the critical habitat. Moreover, NPS has indicated that it has no plans for new development in this location.

3.e.(2) Potential Development Within the Agricultural District

Land in the Agricultural District is generally used for crops, livestock, and grazing as well as for accessory structures and farmhouses. Land in the Agricultural District is not meant to be urbanized, although, in practice, it is sometimes used for large-lot subdivisions. In addition, the probability of the State redistricting land for urban uses is higher for land in the Agricultural District than land in the Conservation District.

Seven of the proposed critical habitat units contain the approximately 14,786 acres in the Agricultural District (Units A1, A2, B1, E1, E2, F, G). Most of this land is either managed by NPS, or in active agricultural use for grazing, and has minimal possibility of being developed for residential use in the next 10 years.

Specifically, DHHL and NPS have both indicated that they have no plans to convert any lands in the State Agricultural District owned or managed by them for residential use. With the exception of two 1-acre parcels owned by the State of Hawai'i and Maui County, the remaining acreage is privately owned. Publicly available real estate information indicates that land owned by Kawela Plantation Homeowner's Association is part of a 5,500-acre recreational preserve for the benefit of the Association. In addition, two landowners have agreed to specific watershed protection management practices through participation in the East Moloka'i Watershed Partnership. For the remaining acreage, approximately 4,436 acres, there are no known plans to develop the land for residential use. However, if such projects are proposed in the future in one or more of the proposed critical habitat units, they would not be subject to section 7 consultation as long as there is no *Federal involvement.* At this point in time, conversion of any of these properties to residential use

would have no known *Federal nexus*.

Potential Project or Activity, Next 10 Years: Resort/residential development—none anticipated

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because no plans exist for resort/residential development in the Agricultural District that overlaps with proposed critical habitat units and there is no anticipated *Federal involvement.*

3.f. Enterprise Community Activities

The entire island of Moloka'i was designated a Federal Enterprise Community in 1999. Based on the four principles of economic opportunity, sustainable community development, community-based partnerships, and strategic vision for change, the Enterprise Community Program works by helping communities develop and implement comprehensive strategic plans which are supported by partnerships among private, public and non-profit entities. Governed by a volunteer community board, Ke Aupuni Lokahi, the Moloka'i Enterprise Community's 10-year strategic plan outlines specific projects to achieve economic growth and community development through environmental protection, the promotion of diversified agriculture, encouragement of tourism, and the addition of new community facilities.

As a result of the Enterprise Community designation, Moloka'i receives Federal funding from the USDA and leverages these funds to receive additional funding and technical assistance from a broad array of partners, including Federal, State, and local government, non-profit organizations, area businesses, public schools, and the University of Hawai'i. In 2002, the Moloka'i Enterprise Community received funds from the following Federal agencies: USDA (EZ/EC grant), Department of Education, Department of Health and Human Services, Department of Housing and Urban Development, Department of Interior, Department of Labor, Economic Development Administration (Department of Commerce), Environmental Protection Agency, USDA NRCS, and USDA Rural Development.

These funds are used for implementation of projects identified in the strategic plan. Priority projects include:

— Environmental protection

- Watershed protection, East Moloka'i
- Brownfield redevelopment
- Historic sites inventory
- Land trust program development
- Solid waste management and increased recycling

— Economic development

- Taro production initiative
- Commercial kitchen
- Aquaculture and fishpond development
- Entrepreneur support
- Establishment of a slaughterhouse

- Creation of a Moloka‘i logo and marketing plan
- Native plant nursery

— Community development

- Establish a Learning Center
- School to work program
- Dialysis treatment center
- Education Coordinator
- Multi-disciplinary human services complex
- Youth leadership program

Other long-term projects include: creation of an islandwide water management plan, erosion control, windbreak plantings, designation of the entire island as a Special Management Area, establishment of traditional use areas, development of a cultural park, designation of nearshore waters as a community-based fisheries management area, construction of a fruit disinfestation facility, provision of on-island mental health services, development of a strategic visitor plan, and establishment of a loan program for affordable home construction.

The majority of these activities are not located within the proposed critical habitat units, but predominantly centered around Kaunakakai and Ho‘olehua. The few activities that may involve the proposed critical habitat units are:

— Activities related to watershed protection are within the proposed critical habitat units (primarily Units C, F and G), but the consultation costs involved with these activities were discussed and included in this analysis under Section 3.c.(1) (East Moloka‘i Watershed Partnership).

— Activities related to the historic sites inventory may take place within the proposed critical habitat units, as Units such as A1, A2 and B1 have cultural as well as biological significance. Because, according to the Moloka‘i Enterprise Community Benchmark Summary Report (October 2001), the historic sites inventory focuses on *training* for cultural, archaeological or ethnographic surveys and compiling the existing surveys, activities associated with this project within proposed critical habitat are minimal.

— Activities related to the development and implementation of a land trust may overlap with the proposed critical habitat units, as many of the units have unique natural and cultural resources that may be appropriate for protection through a land trust. However, as the idea of a land trust is still under preliminary discussion and implementation of a land trust is still an item for the future, it is unlikely that any lands within the proposed critical habitat may be affected within the next 10 years.

Federal Involvement: Funding from USDA and potential matching funds from other Federal agencies

Anticipated Costs of Consultations and Project Modifications: None

Besides the consultation expected in relation to the watershed protection projects, which was taken into account in Section 3.c.(1) of this analysis, no costs of consultations or project modifications are anticipated from any of the Enterprise Community projects in the next 10 years.

3.g. Water Systems

As indicated in Table I-1, components of water systems are located in Units A2, B1, E2, F and G. Units A2 and E2 contain water tanks, and Unit G contains a water tank and a gaging station. Infrastructure belonging to the Moloka'i Irrigation System, including gaging stations, pumping stations, diversion dams, wells, water tanks, reservoirs, pipelines, tunnels, and aqueducts for collecting surface water and pumping groundwater from Waikolu Valley (within Unit B1) and transporting it to the Kualapu'u Reservoir in central Moloka'i (west of Unit F), is contained in Units B1 and F. In addition, infrastructure belonging to Moloka'i Ranch, including pipelines, aqueducts, and water tanks, is contained in Unit F.

3.g.(1) Moloka'i Irrigation System

Initially constructed with the aid of Federal funding, the Moloka'i Irrigation System is operated and managed by the State Department of Agriculture (DOA). It delivers irrigation water to 239 agricultural customers in central Moloka'i. Water improvements require periodic maintenance to insure that pumps continue to run, leaks are detected and repaired, vegetation is cleared from ditch systems, etc.

A recently completed study (2001) of the Moloka'i Irrigation System, commissioned as a result of a severe drought from 1998 to 2001 that lowered the reservoir depth at Kualapu'u to four feet, reviewed ways to mitigate the water shortage. The study contained 30 recommendations, of which 27 were short-term actions to minimize losses, improve irrigation efficiencies, and better manage the Molokai Irrigation System. These actions focus on repair and maintenance or information gathering/improved monitoring to increase efficiencies in the existing system. Such O&M of existing man-made features and structures is not subject to section 7 consultation.

The remaining three recommendations were long-term actions related to the development of new water sources:

(1) Study the feasibility and effect on the environment of collection of runoff water from other sources, including Manawainui, Kaunakakai and Kawela gulches with intermittent stream flows.

(2) Investigate the use of non-potable brackish well water for mixing with Waikolu Valley water for irrigation.

(3) Negotiate an agreement to share or purchase Moloka'i Ranch water.

New water improvements associated with the collection of runoff water from other sources or with the drilling of a new non-potable brackish well could be subject to section 7 consultation if there is *Federal involvement.* Examples of such *Federal involvement* are funding from the USDA or Federal permits under the Clean Water Act for projects that affect streams (e.g., improving a diversion dam, etc.). However, it is highly unlikely that improvement related to new water sources will be proposed or approved in the next 10 years for the following reasons:

— The entire island of Moloka'i is designated as a Water Management Area. This designation requires a permit from the State Commission on Water Resource Management before any new withdrawal, diversion, impoundment, or consumptive use of groundwater

— Environmental and cultural issues of the impact of water removal on the ecosystem, other water sources, the Public Trust Doctrine, and Native Hawaiian rights will necessitate comprehensive studies before any new water project can proceed.

— Under the State's current economic climate and financial constraints, developing new water sources on Moloka'i has not been given priority by the State Legislature, the primary funding entity.

Federal Involvement: Potential partial funding from the USDA

Anticipated Costs of Consultations and Project Modifications: None

No costs of consultations or project modifications are anticipated because no projects are anticipated within the next 10 years.

3.g.(2) Moloka'i Ranch Water System

The Moloka'i Ranch water system provides drinking water to Maunaloa town and Maunaloa Industrial Park, as well as irrigation water for Moloka'i Ranch. Infrastructure belonging to Moloka'i Ranch, including pipelines, aqueducts, and water tanks, is contained in Unit F. Activities anticipated in the next 10 years include repair and maintenance to the existing system.

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because O&M of existing man-made features and structures is not subject to section 7 consultation.

3.h. Communications Facilities

The proposed critical habitat for the listed plants includes communications facilities in Units A1 and A2. A Federal Aviation Administration transmission site, operated by Aeronautical Radio, Inc., overlaps the border of Unit A1 and a Department of the Army radio receiver site overlaps the border of Unit A2. In 2001, the Federal Communications Commission (FCC) completed an informal consultation on a proposed communications antenna site in the urban area of Kaunakakai. The site was not in proposed critical habitat and no plants were affected. Other existing communications

facilities are located near Pu'u Nana, close to Mauna Loa, outside of the proposed critical habitat units.

As discussed earlier, O&M of existing man-made features and structures are not subject to section 7 consultation. But modifications and additions to the existing communications facilities in critical habitat would be subject to consultation. While no modifications or additions are currently anticipated, it is possible that they may be proposed in the next 10 years.

A review of applications to the FCC indicates that there are no current plans to construct new communications facilities in proposed critical habitat. However, it is possible that additional applications will be filed in the next 10 years. Based on the locations of existing communications facilities, there is only a small probability of the development of new communications facilities within the proposed critical habitat units in the next 10 years.

Because the possibility exists, however slight, of activity relating to communications facilities occurring within the proposed critical habitat within the next 10 years, this analysis conservatively estimates the consultation costs associated with such activity.

Potential Project or Activity, Next 10 Years: Permitting of one communications facility

Federal Involvement: FCC and/or FAA permits

Presence of Other Listed Species: Possible, depending on location of facilities

Other Land Management: Possible, depending on location of facilities

Consultation Costs:

- Total Section 7 Costs: $7,500 to $9,100

Estimate based on (1) one consultation in the next 10 years, (2) Low cost from Table VI-1 of a consultation with a Federal agency as the applicant and/or with the involvement of a non-Federal applicant, and (3) the cost of a biological survey, based on a 10-acre open or forested site with easy to medium access. Communications facilities generally have small footprints and access to them could be easy to medium. While other listed species may be present, the entire cost of the consultation is conservatively assigned to the plants, even though the consultation may also address the other listed species.

- Costs Attributable to Critical Habitat: $7,500 to $9,100

Since there have been no consultations on Moloka'i for communications facilities in the mountainous or coastal areas where listed plant species are found, it is difficult to determine whether a consultation would occur without critical habitat designation. It is assumed, conservatively, that all of the section 7 costs would be attributable to critical habitat.

Anticipated Project Modification and Costs: $0 to $100,000

Due to the small footprints of communications facilities, it is likely that the facility will not adversely affect listed plant species. However, if a listed plant population is found, the project may have to be modified. One modification would be to move the site far enough away from the plant

population so that construction will not affect it. If the siting change is made early in the permit process, then the cost of moving the site could be negligible. However, if some or all of the permits have been obtained before the plant population is discovered, new permits may be required for the changed location. The cost of obtaining a Conservation District Use Permit can be between $25,000 and $100,000 (based on information from planning consultants). While most of the existing communications facilities are not located in the Conservation District, this analysis conservatively accounts for the possibility that a future communications facility may be proposed within the Conservation District.

3.i. Trails and Roads

Access to forest and shoreline areas in the proposed critical habitat is by numerous hiking trails, four-wheel-drive trails, unpaved access roads, and a few paved roads (see Table I-1). As discussed in Chapter I, Section 2, these features are considered "unmapped holes" that are found within the boundaries of critical habitat units but are not considered by the Service to be part of the proposed critical habitat. The maintenance of trails and roads would not be subject to section 7 consultation because they are existing man-made features. In addition, access improvements having no *Federal involvement* would not be subject to consultation. However, new trail or roadway improvements could be subject to section 7 consultation if there is *Federal involvement.*

3.i.(1) Unpaved Roads within the State Forest Reserve

The State Na Ala Hele Trails and Access Program, a program within the Division of Forestry and Wildlife within DLNR, maintains the Moloka'i Forest Reserve Access Road (Maunahui Road) and two spur roads, Kaulahuki and Kahanui, as well as a Lookout and Picnic Area at the end of Maunahui Road. These unpaved roads and the recreational facilities are contained within proposed critical habitat units F and B.

The Na Ala Hele Program receives Federal funding from the Federal Highways Administration (FHWA), as Recreational Trails Program funds available under the Transportation Equity Act for the 21st Century (TEA 21). In Fiscal Year 2001, these funds totaled $533,300. The Na Ala Hele program allocates these funds by dividing them equally among Kaua'i, O'ahu, Maui and the Big Island. The funds are used for road and trail restoration and maintenance projects based on need, and are not generally used for new projects. These funds may also be used for trails and access roads managed by other divisions of DLNR, such as the Division of Forestry and Wildlife, depending upon maintenance needs.

Na Ala Hele staff for Moloka'i indicates that no new improvements or renovations are expected to the roads or overlook facilities in the next 10 years, aside from ongoing repair and maintenance that becomes necessary based on environmental conditions and availability of funding.

Federal Involvement: Federal Highway Authority funding

Other Land Management: All of the access roads managed by Na Ala Hele in the proposed critical habitat are also in a State Forest Reserve and within the Conservation District.

Anticipated Costs of Consultations and Project Modifications: None

Because no new roads or significant improvements to existing roads are planned in the next 10 years, no cost of consultation or of project modifications are anticipated.

3.i.(2) Unpaved Roads outside the State Forest Reserve

No consultation costs are associated with unpaved roads outside the State Forest Reserve because 1) there is no known *Federal nexus* for these unpaved roads and 2) maintenance of these roads would not be subject to section 7 consultation because they are existing man-made features.

3.i.(3) Paved Roads

The following paved roadways are located within proposed critical habitat units:

— Less than ½ mile of paved road ending at the Department of Army communications facility in Unit A2

— Numerous roads on Kalaupapa Peninsula, within Kalaupapa and leading to the airstrip and to the former settled area of Kalawao, in Units A2 and B1

— Kamehameha V Highway (State Route 450) bisecting Units E1 and E2.

Information from NPS indicates that no widening or major improvements are planned for the roads contained within proposed critical habitat Units A2 and B1. Information from the State Department of Transportation (DOT) indicates that no widening or major improvements are planned for the portions of road contained within proposed critical habitat Units E1 and E2 in the next three years. In addition, information from the State DOT and the Maui County Department of Public Works and Waste Management, Highways Division, indicates that no federally funded transportation projects are planned on Moloka'i within the proposed critical habitat within the next 10 years.

However, the *Moloka'i Long-Range Land Transportation Plan* identifies the widening of Kamehameha V Highway to 10-foot wide lanes as a priority project, which may affect Units E1 and E2 and may include *Federal involvement.* The project would involve widening the existing road in some locations and obtaining rights-of-way where necessary.

Potential Project or Activity, Next 10 Years: Road widening of Kamehameha V Highway

Federal Involvement: Federal Highway Authority funding

Most of the road construction and improvement projects on Moloka'i are 75 percent funded by the Federal Highways Administration (FHWA) and 25 percent funded by the State.

Presence of Other Listed Species: None

Consultation Costs:

- Total Section 7 Costs: $8,900 to $19,400

Estimate based on (1) one consultation in the next 10 years, (2) Low to Medium cost from Table VI-1 of a consultation with a non-Federal agency as the Applicant, and (3) one biological survey of the 10-acre open site with easy access.

- Costs Attributable to Critical Habitat: $8,900 to $19,400

Because there are no listed plants known to exist in Units E1 or E2, it is unlikely that the FHWA and the State DOT would have consulted without critical habitat designation. Thus, all costs associated with consultation for this project are attributable to critical habitat.

Anticipated Project Modification and Costs: None anticipated

Any roadway widening will be likely to be limited to the area surrounding the existing paved roadway. As long as the project is planned to avoid damage to forests and streams—which is likely to be the case as the planned widening involves adding only two to four feet to the paved roadway and will generally affect the already disturbed areas—the proposed plants critical habitat designation would have little or no economic impact on the project. As a result, no project modifications are anticipated.

3.j. Power Transmission Lines

High-voltage power transmission lines pass several units proposed for critical habitat designation, including Units A2, E1, E2, and F. Since these are existing structures and the main activity associated with them is O&M, they are not subject to section 7 consultation.

Maui Electric Company, Inc. indicates that no new transmission lines are planned for Moloka‘i in the next 10 years.

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications involving electric power transmission lines are anticipated because there are no plans for new power lines and there is no *Federal involvement.*

3.k. U. S. Military Activities

As indicated in Section 2, in August 1997, the U.S. Navy initiated an informal consultation regarding a proposed Marine Corps Training area on privately-owned leased land in west Moloka‘i. This proposal included lands contained within proposed critical habitat units A1 and A2. Because of the potential to adversely affect listed plants, the Service recommended initiation of formal section 7 consultation, but no formal consultation was subsequently initiated. The proposal appears to have been abandoned and no new military activities have been announced. Therefore, no military activity is anticipated to occur on Moloka‘i within the proposed critical habitat in the next 10 years.

Federal Involvement: U.S. Military

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because no plans exist for new military activities on Moloka‘i within the proposed critical habitat units.

3.l. Ecotourism

Commercial hiking tours, horseback riding, and kayaking tours, led by professional naturalist guides and featuring Hawai'i's unique ecosystems and endemic plants, are offered on Moloka'i. While only one Moloka'i operator is a member of the Hawai'i Ecotourism Association, there may be other companies offering ecotourism activities. As shown in Table I-1, the proposed critical habitat designation contains multiple hiking trails. In addition, many of the areas proposed for critical habitat designation are areas of significant natural beauty and cultural value, qualities that also make these areas attractive for ecotourism.

Potential Project or Activity, next 10 Years: Commercial hiking, horseback riding, and kayaking tours

Federal Involvement: None

Anticipated Costs of Consultations and Project Modifications: None

No consultations or project modifications are anticipated because the activity does not have *Federal involvement.*

3.m. Natural Disasters

The most likely natural disasters to affect proposed critical habitat would be a major hurricane passing over Moloka'i, a *tsunami*, or wildfire. While Moloka'i has not been directly hit by a hurricane in the past 50 years, it remains a possibility. In the mountainous regions proposed for critical habitat, wind and water damage caused by a major hurricane could include downed trees and branches as well as washed out roads, trails, and irrigation ditch systems. A *tsunami* hitting the Kalaupapa Peninsula could cause significant damage to the shoreline and to plant life. While little tsunami activity has occurred in the past 30 years, a 1946 *tsunami* caused significant damage to Halawa Valley on the east end of Moloka'i. Further, *tsunamis* have caused more deaths than any other natural disaster in Hawai'i. Finally, Moloka'i has experienced dangerous wildfires in the past, the most recent occurring in 1998, causing an estimated $43 million in damage to wildlife and watershed areas. Recovering from any of these natural disasters could involve clearing away downed trees, branches, and other debris, and rebuilding damaged structures

Potential Project or Activity, next 10 Years: Possible recovery from a natural disaster

Federal Involvement: Financial assistance from the Federal Emergency Management Agency (FEMA)

Consultation and Costs:

In the event of a natural disaster, a consultation with the Service would be required if financial assistance is sought from FEMA to help residents, businesses or government recover from the occasional natural disaster in areas where there are listed species and/or critical habitat. In such emergencies, the Service expedites consultations.

- Total Section 7 Costs: $4,000 to $7,500

Estimate is based on five to 10 days of effort by Service biologists to review the proposed projects at approximately $750 per day. While other listed species may be present, all costs of the consultation are conservatively assigned to the plants even though the consultation may also address the other listed species.

- Cost Attributable to Critical Habitat: $4,000 to $7,500

FEMA has not consulted with the Service in the past on funding for recovery from natural disasters on Kaua'i (Hurricane Iniki), so it is likely that the costs of any future consultations would be attributable to critical habitat.

Anticipated Project Modifications and Costs: Minor

As long as recovery projects are planned so that they avoid further damage to forests and streams—which is likely to be the case—the proposed plants critical habitat designation would have little or no economic impact on FEMA projects following a natural disaster.

4. INDIRECT COSTS

4.a Introduction

Aside from the protection provided by the Act as described in Chapter III, the Act does not provide other forms of protection directly to lands designated as critical habitat. Because consultation under section 7 only applies to activities that have *Federal involvement*, the designation of critical habitat does not afford any additional protections for listed species with respect to strictly private activities.

However, designation of critical habitat may have indirect impacts beyond those associated with the Act. For example, designation may provide the impetus for the State and counties to require additional protections for designated critical habitat that would not otherwise be subject to such protections. These protections may affect both the management of affected lands as well as State and county development approvals. Also, the critical habitat designations may affect property values. These and other indirect impacts are addressed below.

4.b Management of Game Mammals and Loss of Hunting Lands

4.b.(1) The Game-Management Issue

One of the major issues surrounding the proposed critical habitat designations concerns the management of game-mammal populations (i.e., feral pigs, goats and deer) and the potential loss of valued hunting lands. This is a highly sensitive issue throughout the State that for decades has been debated among environmental groups, hunters, biologists and government agencies. The concern does not extend to game birds, however, since the Service currently believes that these birds and the hunting of them do not have a significant adverse impact on listed species or their habitats.

As discussed in the proposed rule, the major threat to the survival and conservation of Hawai‘i’s native plants comes from ungulates, combined with competition from non-native plants. Ungulates feed on the succulent seedlings, stems and roots of various native plants; trample native groundcover and uproot seedlings and other low-growing plants; and create openings and sites where invasive non-native plants can become established and spread. Finally, ungulates carry seeds of non-

native weedy and invasive plants in and on their bodies, thereby distributing invasive plants to new areas, especially along trails, in and around wallows, and in areas that have been rooted up or grazed. Many invasive non-native plants are able to colonize newly disturbed areas more quickly and effectively than can the native plants.

As discussed more extensively in the proposed rule, the Service believes conservation goals for endangered Hawaiian plant species cannot be achieved when feral ungulates are present in "essential habitat areas." Ranked in order of importance, the first of 13 recommended management actions needed to assure the survival and conservation of Hawai'i's endangered plants is "feral ungulate control." Consistent with this finding, the Service opposes land management that allows or enhances the free ranging of large populations of feral ungulates in areas having vulnerable plant species.

Measures to control feral ungulates in protected areas typically include strategic fencing, or barrier fencing, to prevent or limit their migration into designated areas; exclosure fencing to prevent ungulates from entering protected areas; organized hunting to remove them from protected areas; and monitoring ungulate activity so land managers can direct hunters to problem areas. If increased hunting pressure does not reduce feral ungulate activity, land managers may work with hunters to identify and implement alternative methods, which may include trapping in remote areas. All of these activities may reduce the number of game mammals available to hunters and the sizes of hunting areas.

Approximately 10 percent of Moloka'i's resident population are hunters. While many hunters accept the need to protect limited portions of the native forest from damage by ungulates, the majority of hunters strongly oppose removing game mammals from large portions of existing hunting areas. Furthermore, many hunters fear that critical habitat designation will lead to a loss of prized hunting areas as was the case with the court-ordered eradication of sheep and goats from the *palila* critical habitat on the Island of Hawai'i 20 years ago (see Appendix VI-A). Instead, most hunters advocate that game-mammal populations continue to be sustained at levels that are sufficient to allow recreational and subsistence hunting in all but possibly a few of the existing State Hunting Units. They also see themselves as important contributors to controlling feral ungulate populations at reasonable levels and at little cost to the taxpayer.

Also, hunters have expressed concern that critical habitat designations could affect wildlife management projects proposed for Pittman-Robertson funding. The concern is reinforced by the perception that the Service, over the objections of DLNR and its subsequent appeal to the Service, withheld Pittman-Robertson funds for game-management projects in areas proposed for critical habitat designation. (See Appendix VI-A at the end of this chapter for more information on hunting in Hawai'i.)

4.b.(2) Indirect Impacts on Game Management

Section 7(b)(2) of the Act by itself does not require DLNR to manage State hunting lands to protect critical habitat; assure the survival and conservation of listed species; or participate in projects to recover species for which critical habitat has been established. That is, critical habitat designation does not require (1) creating any reserve, refuge, or wilderness areas; (2) fencing for any reason; (3) removing ungulates; or (4) closing areas to hunters. Instead, it requires only that, if DLNR seeks to undertake an activity that may affect the designated area using Federal funding or with a Federal permit, the Federal action agency consult with the Service. Furthermore, DLNR can use Federal Pittman-Robertson funds to selectively fund game-management projects that do not

affect critical habitat, thereby obviating the need for consultations on game management in these areas.

However, critical habitat designation would add weight to the argument that game-mammal populations should be eliminated or reduced substantially in affected areas because they threaten Hawai‘i’s native plants. In turn, DLNR may elect to change its game-management strategies to reflect this shift in priorities.

4.b.(3) Indirect Impacts on Hunting Conditioned on a Change in Game Management

Assuming, for the sake of illustration, that DLNR adopts a policy of reducing game-mammal populations substantially in the State Hunting Units that overlap critical habitat units, then the following impacts related to hunting could be expected.

Hunting Activity

Initially, the number of hunting trips into the more accessible critical habitat units would increase. But after the populations dropped to lower levels, the number of hunting trips into these units would probably drop also because of low success rates.

Some hunters might continue to hunt in critical habitat units for the wilderness experience, and some might switch to hunting game birds. But the most likely outcome is that most of them would switch to State Hunting Units outside the proposed critical habitat, increasing hunting pressures in these areas even more. And some hunters might choose to hunt less or not at all, spending their discretionary time and funds instead on other recreational pursuits. Finally, some hunters may switch to hunting on privately-managed hunting lands on Moloka‘i.

Economic Activity

To illustrate the magnitude of the impacts, if about half of those who hunt game mammals on the affected lands were to give up hunting, then hunting activity on Moloka‘i could drop by about 38 percent (half of 75 percent, which is the estimated percentage of the accessible State-managed hunting lands on Moloka‘i proposed for designation). This translates into a decrease in economic activity related to hunting on Moloka‘i of about $129,000 in direct sales (38 percent of $340,000); $255,000 in total direct and indirect sales (38 percent of $670,000); five jobs (38 percent of 12 jobs); and $106,000 in income (38 percent of $280,000). Total economic activity related to hunting on Moloka‘i is documented in Appendix VI-A.

For the most part, the $129,000 decrease in expenditures by the displaced hunters would probably be spent on other activities, goods and services. This would create economic activity that would offset the decrease in economic activity related to the reduced expenditures on hunting. Thus, the net economic impact would probably be small. However, there would be distributional impacts, with some providers of goods and services benefiting at the expense of the stores and service-providers catering to hunters.

Hunter Benefits

Although a reduction in hunting activity would probably result in a small net change in economic activity, it would result in a loss in value or benefit to hunters (consumers’ surplus)—see Appendix VI-A for the total benefits related to hunting on Moloka‘i. Under the given assumptions,

this loss is estimated at $53,000 (38 percent of the current $140,000 in surplus value). But partially offsetting this loss to hunters would be benefits derived from activities that replace game-mammal hunting.

Pittman-Robertson Funding

In some states, a reduction in the number of licensed hunters could reduce the amount of Federal Pittman-Robertson funding the state receives. The reason for this is that the formula used to calculate the distribution of funds is based in part on the number of licensed hunters. However, Hawai'i currently receives the minimum amount of funding in relation to the number of hunters.

Thus, any drop in the number of hunters would have no effect on the amount of funding Hawai'i receives. Furthermore, if a Pittman-Robertson project is denied by the Service, or DLNR decides not to proceed with a proposed project, the associated Pittman-Robertson funds would not be lost. Instead, DLNR could use the funds to support another wildlife management project.

State Expenditures

Finally, DLNR would probably have to expend more funds to maintain low game-mammal populations in areas that no longer attract hunters because of low success rates, and to control non-native plants and weeds in degraded areas where large populations of game mammals no longer browse.

4.b.(4) Probability of a Change in Game Management

The above outcome would occur only if the State were to adopt a new policy to reduce game-mammal populations substantially in critical habitat units that overlap with State Hunting Units. However, a major change in State management of game mammals on Moloka'i is not expected.

As mentioned above, the debate about the management of game-mammal populations is a highly divisive and contentious one that has been argued for many decades in Hawai'i—a debate that long preceded the Moloka'i plant species listings and the proposed critical habitat designations. Critical habitat designations would not change the nature of the debate significantly, but they would expand the geographic focus to include areas that were not considered in previous consultations because they do not support listed plant species.

But, even with the added weight of this argument, the probability is slight that the State would adopt a policy to substantially reduce game-mammal populations in critical habitat units that overlap with State Hunting Units. This judgment is based on discussions with DLNR, others familiar with the subject, and decades of public testimony by hunters. Simply put, the scenario is not regarded as politically realistic: hunters would vigorously oppose a proposed reduction in game populations.

In addition to the political problem, there are concerns within DLNR about the cost and feasibility of the removal of large numbers of game mammals from about 14,500 acres dispersed among critical habitat units. The most costly item would be removing ungulates from inaccessible areas and the stragglers remaining after hunters lose interest when their success rates drop. DLNR could utilize helicopters at this stage to hunt game, but this is expensive and ineffective in forested areas. Also, snares could be used to trap animals, but DLNR believes that checking them daily is costly; they pose risks to hunting dogs; they are regarded as inhumane; and they evoke complaints from the public.

Once the game mammal populations are reduced, there are additional concerns within DLNR about the cost of maintaining low populations—particularly if hunters are not interested in hunting in an area due to low success rates or difficult access. And where strategic fencing is in place, there are concerns about the periodic cost of repairing or replacing sections of fencing that have been vandalized.

4.b.(5) Net Economic Impact

In summary, the probability of a major change in game management in Hawai‘i is regarded as slight, even though the proposed critical habitat designation would add weight to the argument that game-mammal populations should be reduced substantially in affected areas. Thus, designation of critical habitat is expected to have minor economic impacts related to management of game mammals and to hunting.

4.c. Conservation Management

In previous critical habitat designations, private landowners have expressed concern that they will be required to alter the management of their lands that fall within the designation so as to assure the survival and conservation of listed species, regardless of whether they plan to propose any changes to land uses or activities in the future. Specifically, some have expressed concern that this new obligation will be expensive and they will have to pay most or all of any costs that may be associated with managing the land to assure survival and conservation of the species. Discussed below are the existing and potential obligations under the Act associated with this type of land management, management activities that would enhance the survival and conservation of listed plants, and the costs of such management activities.

4.c.(1) Requirements for Conservation Land Management

Existing Federal Requirements

Section 7(b)(2) of the Act by itself does not require landowners to manage their lands to protect critical habitat, assure the survival and conservation of listed species, or participate in projects to recover species for which critical habitat has been established. That is, critical habitat designation, by itself, does not require any landowner to: (1) create any reserve, refuge, or wilderness areas; (2) fence for any reason; (3) remove ungulates, rodents, or weeds; (4) close areas to hunters or hikers; (5) initiate conservation projects; or (6) prepare special land-management plans.

Instead, it requires only that a Federal agency that provides funding or permits for any activity that may affect the designated area must consult with the Service. Moreover, designation can help identify areas that would benefit from additional conservation land management.

Existing State Requirements

Under existing State law, a Federal designation of critical habitat would not subject the land to any additional State requirements. In fact, Hawai'i's endangered species law (Hawai'i Revised Statutes, Chapter 195D [HRS, 195D]), does not include or even mention "critical habitat."

Potential Requirements: Court Ruling on *Taking*

Even though there is no direct requirement under Federal or State law to proactively manage lands to protect listed species and their habitats, some landowners speculate that, pursuant to litigation, a Federal or State court could mandate conservation management of privately owned critical habitat. The legal decision would be based on an interplay among the Act, the State's endangered species law, and various State laws and State Administrative Rules that protect the ecosystems of threatened and endangered species (see Chapter IV for more detail on these State requirements).

Under State law, prohibited activities include the *taking* of any native threatened or endangered plant (Chapter IV). If a court finds that an action degrades a critical habitat, then landowners foresee that this action could be viewed as "injury" to the plant, regardless of whether the individual plant would be harmed directly by the proposed action (i.e., the action could harm a portion of the habitat of a listed plant, but not the plant itself). In turn, this "injury" to the habitat could be viewed as an illegal *taking* of the plant. Under State law, all projects and activities could be covered, regardless of *Federal involvement*. For example, allowing ungulates to roam free could be viewed as an activity that degrades a critical habitat and therefore amounts to a *taking* of a listed species. This argument is similar to the one that was used successfully in Federal court to order the eradication of sheep and goats on Mauna Kea to protect the critical habitat of the endangered *palila* bird (discussed in the appendix to this chapter, Appendix VI-A). In that case, the population of sheep and goats was actively managed by DLNR for the purpose of game hunting.

Under Federal law, the prohibition on *taking* in the Act applies to fish and wildlife, but not to plants outside areas under Federal jurisdiction. Nevertheless, section 9(a)(2) of the Act makes it unlawful to "remove, cut, dig up, or damage or destroy any such (listed plant) species on any [land outside Federal jurisdiction] in knowing violation of any law or regulation of any State or in the course of any violation of a State criminal trespass law." Since the *taking* of listed species in Hawai'i is unlawful under State law, it is therefore unlawful under Federal law (23(3): 307-320). As a result, in Hawai'i, the Act's prohibition against *taking* applies not only to fish and wildlife, but also to listed plants.

Application to Critical Habitat

As noted above, even without the proposed critical habitat designation, the precedent set in the *palila* case already looms as a potential requirement for private landowners. For example, in a case brought under the Act, a court might mandate conservation management of privately owned land in existing habitat and/or federally-designated critical habitat based on the argument presented in the *palila* case. For this situation, the effect of the proposed critical habitat designation could be to expand and define more precisely the geographic extent of habitat that could be the subject of such a court decision.

In the event that a case is brought under State law, landowners speculate that State agencies or a State court might interpret various State Administrative Rules and State laws that protect

"ecosystems" of threatened and endangered species to mean protection of the "critical habitat" of these species–even though "critical habitat" is not mentioned in State laws. As a result, the proposed critical habitat designation could expand and define more precisely the areas that might be affected by State court rulings.

4.c.(2) Conservation Management to Protect Listed Plants

As indicated in the proposed rule, the major threats to native plants come from ungulates, combined with competition from non-native plants.

In response to these and other threats, management actions needed to assure the survival and conservation of Hawai'i's listed species include: (1) feral ungulate control (e.g., strategic or barrier fencing to prevent or limit ungulates from migrating into large protected areas, exclosure fencing to prevent them from entering an area, extensive hunting and trapping to remove them from protected areas, one-way gates that allow animals to leave but not to enter an area, and monitoring transects for the presence of ungulates); (2) non-native plant control; (3) rodent control; (4) invertebrate pest control; (5) fire management; (6) maintenance of genetic material of the endangered and threatened plant species; (7) propagation, reintroduction and/or augmentation of existing populations into areas deemed essential for the conservation of species; (8) ongoing management of the wild, outplanted and augmented populations; and (9) habitat management and restoration in areas deemed essential for the conservation of species.

4.c.(3) Costs of Conservation Management Activities

The cost of implementing the above management actions would depend on the circumstances: the size of the area being managed, its location and access, the terrain, the quality of the native vegetation, ungulate populations, the extent of weeds, the risk of fire, land-management goals, etc.

For large mountainous areas such as watersheds, the greatest costs typically are incurred in the early years, with the most expensive items being fencing and removing ungulates. Depending upon location and terrain, the cost of fencing, including materials and installation, ranges from less than $30,000 per mile for areas that are accessible via a short drive, to as much as $170,000 per mile for remote locations that must be reached by helicopter (based on information from DLNR and NPS).

Depending upon the circumstances, annual conservation-management costs range from an average of less than $30 per acre to more than $80 per acre (based on information from DLNR, NPS, and private organizations). These figures are based on managing large, contiguous areas in the mountains; per-acre costs for managing small, dispersed areas could be significantly higher.

In addition to land-management costs, conservation of endangered plants (i.e., propagation, reintroduction and/or augmentation, fencing to protect from ungulates, monitoring, etc.) can be expensive. For example, a five-year effort to plant 25,000 silversword on Mauna Loa and Mauna Kea on the Big Island, which is regarded as being relatively straightforward and does not require weed control, is estimated at $1 million (estimate provided by DLNR, 2001).

Government cost-sharing programs are available to fund conservation projects (see Chapter IV), but current funding is inadequate to support such projects for all the lands in Hawai'i that are being proposed for critical habitat.

4.c.(4) Potential Cost of Conservation Land-Management Due to Critical Habitat

In summary, an undetermined probability exists that a Federal or State court could mandate conservation management of critical habitat based on the interplay between the Act and State requirements. However, it is beyond the scope of this economic analysis to assess the legal merits of the above arguments, or the probability that one or more lawsuits would be filed and, if filed, to identify possible outcomes of a court decision and the associated probabilities.

But for the purpose of developing a conservative estimate of the potential cost of the proposed critical habitat designation, this analysis will assume that conservation management is mandated. This analysis also assumes that the conservation management is mandated for all of the proposed critical habitat that is in the mountains of Moloka‘i -- approximately 28,000 acres (65 percent) of the proposed critical habitat -- since valuable natural resources such as watersheds and rare species tend to be concentrated in those areas. Under such a circumstance, the critical habitat proposal could cost landowners on Moloka‘i $840,000 to $2,240,000 per year to manage these areas (based on $30 to $80 per acre). Based on land ownership of these areas, about $400,000 to $1,053,000 per year would be a State obligation and about $440,000 to $1,187,000 per year would be an obligation of private landowners. Importantly, to varying degrees, some of these lands are already managed as NARs or Natural Area Partnership programs (see Table I-1 and Chapter IV), and therefore these estimates may overstate actual management costs. The related increase in economic activity is discussed in the section on benefits (Section 6).

If the required conservation management were to include removing ungulates, an additional loss could include the economic activity and benefits related to hunting. As discussed earlier, this loss would amount to about $255,000 per year in direct and indirect sales, and $53,000 per year in benefits to hunters. However, any loss in economic activity and benefits would be largely offset by hunters spending on other activities that replace hunting.

4.d. Subsistence and Native Hawaiian Traditional and Cultural Practices

A major concern among community members is the effect of critical habitat designation on Native Hawaiian traditional and cultural practices, including subsistence activities. Specifically, there is the concern that designation of critical habitat may interfere with or restrict the practice of subsistence and other traditional and cultural practices.

4.d.(1) Subsistence and Native Hawaiian Rights

The Hawai‘i State Constitution, Chapter 12, Section 7 reads:

> "The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua‘a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778 subject to right of the State to regulate such rights."

As indicated by this constitutional provision, subsistence and Native Hawaiian rights are closely tied. In early Native Hawaiian life, gathering activities supplemented the cultivated food and medicinal staples of the people, helped people survive in times of famine, and allowed tenants to retrieve large amounts of a product for a communal purpose, such as a tree for a canoe.

Today, both Native Hawaiians and non-Native Hawaiians living on Moloka'i participate in subsistence activities on a regular basis. Defined narrowly, subsistence consists of the non-commercial and non-recreational harvest of fish, game, marine mammals, plants and other products of the land for personal or communal use. The subsistence lifestyle also includes the processing of these products for food, clothing and other uses as well as sharing or exchanging these products with others in the community. Defined more broadly, subsistence includes a lifestyle choice for some non-Native Hawaiians. For Native Hawaiians, it is central to their culture and way of life.

While Hawai'i's subsistence economy drastically changed with the changes in the land tenure system, Native Hawaiian traditional rights of access and gathering, for subsistence or other purposes, were not extinguished by the inconsistency between access for gathering and the exclusivity traditionally associated with fee simple ownership of the land. (Kalipi v. Hawaiian Trust Co., 66 Haw. 1, 656 P.2d 745 (1982); Public Access Shoreline Hawai'i (PASH) v. Hawai'i County Planning Commission, 79 Haw. 425, 450 (1995), cert. denied, 517 U.S. 1163 (1996)). However, access is guaranteed only in connection with undeveloped lands, and while the Hawai'i Supreme Court has ruled that the State Constitution does not prevent development by landowners, the point at which land becomes sufficiently developed to where it is inconsistent to allow or enforce the practice of traditional Hawaiian gathering rights on such property remains undecided. (PASH, 79 Haw. at 450).

4.d.(2) Practice of Subsistence on Moloka'i

Studies of contemporary subsistence in Hawai'i have documented subsistence practices and formulated conceptual plans for communities on Hawai'i, Moloka'i, Maui, and O'ahu. Subsistence and Native Hawaiian traditional and cultural practices are very important on Moloka'i. Of the major islands, Moloka'i has the highest percentage of Native Hawaiian residents, and although subsistence on Moloka'i is long established as Hawaiian custom and practice, other ethnic groups who have settled on the island and adapted to the rural lifestyle also engage in and benefit from subsistence activities.

Subsistence plays an important role in community life, including:

- Providing Moloka'i families with essential resources that compensate for low income and high unemployment rates.
- Preserving traditional Hawaiian cultural values, customs and practices as cultural knowledge. Place names, fishing *ko'a* (shrines), methods of fishing and gathering, and the reproductive cycles of marine and land resources have been passed down from one generation to the next through training in subsistence skills.
- Providing a basis for sharing and gift-giving within the community and reinforces good relations among members of extended families and neighbors.
- Allowing family members of all ages to contribute to family welfare.
- Fostering conservation; traditional subsistence practitioners are governed by particular codes of conduct intended to ensure the future availability of natural resources.

- Providing a valuable, but relatively inexpensive, form of exercise and stress reduction.

- Increasing the time spent in nature, cultivating a strong sense of environmental kinship that also is a foundation of Native Hawaiian spirituality.

- Providing a link to the traditions and ways of life of previous generations – to the ways of the *kupuna* (elders) and the previous occupants of the land.

(Molokaʻi Subsistence Task Force: Final Report 1994).

A 1993 survey of a random sample of Molokaʻi's population found that:

- Among all families surveyed, 28 percent of their food is acquired through various subsistence activities.

- Among Hawaiian families surveyed, 38 percent of their food is acquired through subsistence activities.

- Twenty-five percent of the respondents stated that 50 percent of more of their food came from subsistence activities.

- Respondents reported receiving food acquired through subsistence activities approximately once a week.

- Virtually every respondent believed that subsistence was important to the lifestyle of Molokaʻi.

The Molokaʻi Community Plan (2001) reflects the importance of subsistence and of traditional and cultural practices, explicitly setting forth "[t]he continued practice of subsistence as a part of the Molokaʻi lifestyle which incorporates and fosters the traditional and cultural values of conservation, *malama* ʻ*aina* and ʻ*auwana* as a community goal."

4.d.(3) Concerns Regarding Impact of Critical Habitat Designation

One major area of concern to subsistence practitioners, even prior to the proposal to designate areas of Molokaʻi as critical habitat, is the issue of access across property to conduct subsistence activities. Of particular concern in the past has been the closure of areas formerly open due to the transfer of ownership.

Residents have expressed concern that conservation management activities associated with the designation of critical habitat, such as fencing, may reduce or prevent public access. Similarly, some residents have expressed concern that critical habitat designation may result in the removal of ungulates from areas traditionally hunted for subsistence. Finally, some residents may be concerned that the designation of critical habitat will prohibit or restrict subsistence activities within these areas.

4.d.(4) Impact on Subsistence and Native Hawaiian Traditional and Cultural Activities

Subsistence activities, including fishing, hunting, ocean gathering, and forest and stream gathering, occur all over the island of Moloka'i. Relating to the proposed critical habitat:

- Subsistence fishing and ocean gathering occur along the coastline of units A1, A2, B1, C and D.
- Subsistence hunting occurs within units B1, D, F and G.
- Subsistence forest and stream gathering occurs within units A2, B1, C, F and G.
- Future sites identified to access and/or protect are found in units A1, A2, B1, C, D and F.
- Access through proposed critical habitat units A1, A2, B1, C, D, E1, E2, F, and G may be necessary to reach traditional areas of subsistence activity.

As noted earlier in Section 4.c, an undetermined probability exists that a Federal or State court could mandate conservation management of critical habitat based on the interplay between the Act and State requirements, which could involve activities such as fencing or ungulate removal that might reduce the ability of Native Hawaiians to practice subsistence activities in these areas. In addition, the State or private landowners could adopt a policy of restricting access into areas that overlap critical habitat units without a judicial mandate. The resulting economic impact under either scenario is difficult to estimate, as discussed below.[16]

The total economic value of subsistence is the total amount that subsistence participants and others would be willing to pay to engage in subsistence activities independent of whether they actually pay that amount. While it is possible to measure this total value for recreational activities like fishing, the discussion below describes why typical methods of estimating economic value do not work when applied to subsistence.

One method for measuring willingness to pay, contingent valuation, is based on asking people how much they would be willing to pay to engage in subsistence, or how much they would need to be compensated to stop engaging in subsistence. To Native Hawaiians who consider subsistence to be a right or way of life, such questions have no meaning. In addition, some Native Hawaiians involved in the subsistence lifestyle on Moloka'i have modest incomes and may be considered economically disadvantaged compared to other groups when responding to questions involving relative values based on monetary income.

The other commonly used method, known as travel cost, would estimate the value of subsistence by observing how often people visit sites at different distances with different characteristics. The value of different sites to subsistence participants may be estimated by determining how the number of visits is correlated with site distance while controlling for

[16] This analysis borrows from *Economic Assessment of Bristol Bay Area National Wildlife Refuges: Alaska Peninsula/Becharof Izembek Togiak Final Draft*, prepared by the Institute of Social and Economic Research and Industrial Economics, Incorporated, for the Service in December 1998.

differences in site characteristics. In theory, this method could determine the net economic value of subsistence activities in specific locations and thus be used to value the use of proposed critical habitat for subsistence activities. The practical difficulties in conducting such a study make it virtually impossible to conduct, and no such studies have ever been done.

One way to portray the importance of subsistence activities, a large share of which are for the collection and preparation of food, is by calculating the nutritional value of the products of the harvest. However, while it is known that food derived from subsistence activities makes up approximately one-third of an average Moloka'i family's diet, the total nutritional value of this component is unknown, as is the proportion of the food derived from subsistence activities conducted in the proposed critical habitat.

Another way to portray the importance of subsistence activities is to use replacement cost to estimate its value. Replacement cost is defined as the market prices of the food and other commodities obtained through subsistence. The net value of subsistence would then be calculated by subtracting out the costs of engaging in subsistence. But replacement cost is an inappropriate measure of the total economic value of subsistence because it produces an underestimate of total economic value by not including the value associated with the activity of subsistence itself, independent of its product. For many different reasons, people engaged in subsistence value the experience independent of the harvest. For example, people on Moloka'i engaged in subsistence may value the experience for the opportunity to share cultural knowledge with younger generations and for the connection with nature.

Because replacement cost underestimates the total economic value of subsistence activities, it is best to avoid its use altogether. Not only is the underestimation likely to be considerable, but its use also validates and perpetuates the idea that the total value of subsistence lies in the market value of its products. In addition, there are practical difficulties in determining the replacement cost of many subsistence products, like *limu* or deer meat, that are not found in the grocery store.

However, the products of subsistence do represent income-in-kind to the residents of these communities. When measuring the economic well-being of residents of Moloka'i, it is necessary to include not only money income, but also the monetary value for any goods or services that the residents receive, which is known as income-in-kind. Typical examples of income-in-kind are the rental value of owner occupied housing and the value of products produced and consumed on family farms. Typically a value is placed on these goods and services based on observed prices in markets for these products. Estimation of this income-in-kind shows both the market value of the products harvested and the importance of these products as a source of income to the residents of Moloka'i. For this calculation the use of replacement cost is appropriate. However, without information on the amount of subsistence harvest, it is impossible to provide estimates.

4.d.(5) Potential Subsistence-Related Costs Due to Critical Habitat

The value of subsistence activities, and continued public access to conduct these activities, to the residents of Moloka'i is difficult to quantify because of the lack of information on the amount of the subsistence harvest. Further, the impact of a worst-case scenario that restricts access and prohibits subsistence activities in all areas proposed for critical habitat designation is complicated by the fact that subsistence activities also occur in areas outside the proposed critical habitat. The relative importance of the areas located within critical habitat versus those outside the proposed critical habitat is not documented. Presumably, a restriction in access would result in subsistence practitioners switching to locations outside the proposed critical habitat.

However, such a switch would have an impact. Clearly, subsistence fishing, ocean gathering, hunting, and forest and stream gathering, play an important role in the cultural and social framework of the community. The cultural aspect of subsistence does place value on the location where the activity is conducted. In addition, the areas within the proposed critical habitat used for subsistence activity may have greater importance than their size may indicate. For example, an area within the proposed critical habitat may be the only location on the island to collect a certain plant used for medicine. As such, there could be a significant, though undetermined, loss associated with restriction of subsistence activities in the proposed critical habitat.

However, the probability of the worst-case scenario, resulting in the restriction of access and prohibition of subsistence activities in all areas proposed for critical habitat designation is undetermined, but is generally unlikely. More likely to occur are restrictions in small, localized areas of significant biological importance. Such restrictions would reduce significantly the potential impact on subsistence activities, and access across the proposed critical habitat would be minimally impacted, if at all.

4.e. State Redistricting of Land

4.e.(1) Concerns about Redistricting

Another concern raised by private landowners is that once critical habitat is designated on their land, the State may redistrict it from the Agricultural District to the Conservation District. In turn, this will result in (1) a reduction in the value of the land; (2) lost current or potential agricultural use of the land; (3) higher property taxes because Conservation land can be assessed at a higher value than Agricultural land; and (4) reduced ability to secure bank financing. These concerns, as they relate to Moloka‘i, are discussed below.

4.e.(2) Affected Lands

On Moloka‘i, about 9,000 acres of privately owned land in the Agricultural District are proposed for critical habitat. Affected areas include grazing land in Units A1, A2, E1, E2, F and G, and recreational preserve and watershed protection areas in Units F and G.

4.e.(3) Probability of Redistricting

The concern about potential redistricting of land designated as critical habitat stems from State statutes for Conservation of Aquatic Life, Wildlife and Land Plants (HRS, 195D) and the Land Use Commission (HRS, 205):

— Protection of Hawai'i’s Unique Flora and Fauna (HRS 195D-5.1)

> DLNR “… shall initiate amendments to the Conservation District boundaries … in order to include high quality native forest and the habitat of rare native species of flora and fauna within the Conservation District.”

— Districting and Classification of Lands (HRS 205-2(e))

> “Conservation Districts shall include areas for conserving indigenous or endemic plants, fish and wildlife, including those which are threatened or endangered.”

— Land Use Commission Decision-making Criteria (HRS 205-17)

"In its review of any petition for reclassification of district boundaries …, the commission shall specifically consider … the impact of the proposed reclassification on … (the) preservation or maintenance of important natural systems or habitats."

DBEDT's Office of Planning (OP) is responsible for conducting a periodic review of State District boundaries, referred to as the "boundary review." During the boundary review, OP considers whether the existing District boundaries are appropriate, taking into account current land uses, environmental concerns, and other factors. Critical habitat would prompt OP to consider redistricting from the Agricultural, Rural or Urban Districts to the Conservation District (DBEDT, Office of Planning).

However, such redistricting of privately owned land is likely to occur in only a limited number of cases. This assessment is based on the following:

— Critical habitat designation alone would not prompt the State to propose redistricting. A number of other factors would come into play, such as the quality of the native habitat, the value of the land as watershed, slopes, etc. (DBEDT, Office of Planning).

— Approval of redistricting requires six affirmative votes from the nine commissioners, with the decision based on a "clear preponderance of the evidence that the proposed boundary is reasonable" (HRS 205-4).

— Private landowners strongly oppose proposals to redistrict their lands if they believe this might result in a decrease in property value and/or a loss in the economic use of their lands. Furthermore, they may file lawsuits claiming an unconstitutional taking of property.

— In the last State District boundary review, only four privately owned parcels were redistricted to Conservation.

4.e.(4) Cost of Contesting Redistricting

Even though the probability of redistricting private land to Conservation may be low, contesting a redistricting action can be time-consuming and costly for the landowner. Based on the last boundary review, some landowners report spending over $50,000.

4.e.(5) New Restrictions on Land

Even if land is not redistricted, the State may seek agreements with landowners to protect the habitats of listed species as an incentive to retain their existing District designation. Based on the last boundary review, this could involve agreements to reforest lands using native species, or to not subdivide or develop land that is habitat for listed species. Such requirements restrict future land use, thereby lowering property values.

4.e.(6) Reduction in Land Values Due to Redistricting

Reductions in land values due to redistricting land from the Agricultural District to Conservation could range from about $1,000 per acre for remote agricultural land (or less for gulch land) to $75,000 or more per acre for land suitable for development. For a particular parcel, the per-acre reduction in value resulting from redistricting would depend upon location, access, terrain, county plans and zoning, available infrastructure, development potential, etc. If all the privately owned property on Moloka'i proposed for critical habitat designation were to be redistricted, the total per-acre reduction in value could range from $9 million to $675 million. However, values in the lower end of the range would apply to most of the privately owned Agricultural land being proposed for critical habitat on Moloka'i. Even if a landowner has no plans to sell the land, the loss in land value could reduce potential mortgage financing.

4.e.(7) Reduction in Agricultural Use of the Land

If land is redistricted to Conservation, grazing could continue depending upon which subzone is assigned: grazing is not allowed in the Protective Subzone, but is allowed in other subzones with permission of the State Board of Land and Natural Resources (BLNR).

If grazing is not allowed, the per-acre loss in economic activity would be small since grazing is a low-value, marginally profitable activity that typically generates land rents of less than $10 per acre per year (based on information from landowners and ranchers).

4.e.(8) Changes in Property Taxes, Agricultural Land

Even though land values would decrease if Agricultural land were redistricted to Conservation, property taxes could remain the same, or they could increase or decrease. The change in taxes would depend on whether the land was dedicated to agriculture; if so, the land would be assessed at a low agricultural value rather than its higher market value. Because of a State policy to encourage agriculture, property taxes on land dedicated to agriculture are generally lower than they are with similar land in the Conservation District that is not used for agriculture.

For grazing land, an informal survey of TMK (Tax Map Key) records on Moloka'i found assessed values on Moloka'i ranging from $100 to $335 per acre. The applicable tax rate is $4.93 per $1,000 of assessed value. If the land is in the Conservation District and used for grazing, then the assessed value and the property taxes would be the same as for Agricultural land. Non-grazing land in the Conservation District would not benefit from the State policy of assessing a low agricultural value instead of market value for Conservation land.

An informal survey of TMK records on Moloka'i found assessed values for Conservation land ranging from $20 to $34,000 per acre, depending upon location. Conservation land is taxed at the same rate as Agricultural land, $4.93 per $1,000 of assessed value.

Thus, if Agricultural land used for grazing is redistricted to Conservation and grazing is allowed to continue, then property taxes would remain the same. In both cases, the land will be assessed at its agricultural value and taxed at the rate of land in the Agricultural District.

But if Agricultural land used for grazing is redistricted to Conservation and grazing is <u>not</u> allowed to continue, then property taxes may increase if the Conservation land value is higher than the assessed value of the land in active agricultural use. This could occur even though the actual

value of the land would be lower if it is redistricted to Conservation. This counter-intuitive result reflects the tax break the State gives to encourage agriculture.

If Agricultural land is not used for agriculture, then its assessed value is its estimated market value. In that case, redistricting to Conservation would result in a lower assessed value for the land and lower property taxes.

4.e.(9) Potential Redistricting-Related Costs Due to Critical Habitat

An undetermined probability exists that critical habitat designation could result in some privately owned Agricultural land being proposed for redistricting to Conservation. If this were to occur, then the affected landowner could spend more than $50,000 contesting the redistricting. Since this could involve approximately 13 private landowners on Moloka'i, total costs could exceed $650,000.

Further, there is a small probability that critical habitat designation could in fact result in Agricultural land being redistricted to Conservation. However, as noted above, the per-acre loss in economic activity would be small since grazing is a low-value, marginally profitable activity that typically generates land rents of less than $10 per acre per year. Based on an estimate of approximately 7,300 acres of the designation being used for ranching, the annual cost of restricting grazing on Moloka'i as a result of critical habitat is approximately $73,000 (7,300 acres * $10 per acre per year).

4.f. State and County Development Approvals

4.f.(1) Concerns about Development Approvals

As discussed below, a major concern among private landowners, developers, and other interested parties is that critical habitat designations will significantly affect State and county development approvals, even when there is no *Federal involvement*. They are concerned that areas designated as critical habitat will be interpreted by government officials as "environmentally sensitive," and that this will result in increased difficulty in securing development approvals for both new projects and for improvements to existing structures. The argument against approvals would be that critical habitat must be protected, and development should be limited or not allowed within critical habitat boundaries.

Related concerns are that critical habitat will result in more expensive environmental studies, delayed projects, costly project modifications, increased risks of projects being denied and, for projects that are approved, the possibility of high legal fees to fight lawsuits designed to prevent or substantially alter projects. In addition, there is the concern that activities relating to maintenance and repair of existing structures within the proposed critical will become subject to additional state or county approval.

The primary focus of the concern lies with potentially controversial projects that: (1) are in portions of the critical habitat that were not previously recognized as being environmentally sensitive because they contain no listed species, and (2) require major funding or discretionary approvals by the State or county. Discretionary approvals could include redistricting by the State Land Use Commission, approvals by BLNR for projects in the State's Conservation District, General Plan or Community Plan amendments by county councils, etc.

4.f.(2) State and County Environmental Review

Based on discussions with planning consultants and government officials, critical habitat designations are likely to increase the level of environmental analysis. The reason for this is that State and county agencies would require developers to address the impact of projects on critical habitat and related public concerns.

Subject to certain exemptions, a State Environmental Assessment (EA) or Environmental Impact Statement (EIS) is required for projects that: (1) use State or county lands or funds; (2) are in the Conservation District; (3) are in the Shoreline Setback Area (usually 40 feet inland from the certified shoreline); (4) require an amendment to a county plan that would designate land to some category other than Agriculture, Conservation or preservation; or (5) involve reclassification of State Conservation District lands. If a project "substantially affects a rare, threatened, or endangered species, or its habitat," then a State EIS might be required instead of the simpler and less expensive EA.

It is reasonable to assume that, although State law does not include the concept of critical habitat, the term "habitat" (which, in Hawai'i, includes areas that support listed threatened and endangered species) may eventually be interpreted by decision-makers to include "critical habitat" (which may include areas that could support listed species but presently do not). Those arguing in favor of this interpretation would include environmental groups, those who may oppose development, and possibly some government agencies. Eventually a developer may elect to, or be required to, submit a State EIS based on the fact that a project is located in a critical habitat. Once the precedent is set, succeeding developers may be required to submit State EISs under similar circumstances. Furthermore, a court may interpret "habitat" to include "critical habitat."

If critical habitat designation results in a requirement for a State EIS instead of an EA then, depending upon the complexity of the project, this could cost $25,000 to $75,000 more than an EA (based on estimates from Hawai'i planning firms). Also, preparing and processing a State EIS would take about two months longer than an EA. In addition, biological surveys could be required.

4.f.(3) Project Modification

If a proposed project requires major State or County approvals and is within critical habitat, developers are likely to be required by State and county agencies to request comments from the Service on the project. If the Service indicates that the project would have a negative impact on the habitat of listed species, then State and county agencies probably would require project mitigation to address Service concerns. This would be expected even with no *Federal involvement*. The cost of the mitigation would depend upon the circumstances.

4.f.(4) Affected Projects and Increased Costs

As noted earlier in the chapter, there are no specific development plans for areas within the proposed critical habitat within the next 10 years. Therefore, affected projects on Moloka'i are not reasonably foreseeable, but could arise. However, over the next 10 years, the number of such projects is expected to be small because most of the proposed critical habitat units are (1) in mountainous areas that are unsuitable for development due to difficult access and terrain, and (2) within the State's Conservation District where land-use controls severely limit development or within the County's Agricultural District where land-use controls and the Moloka'i Community Plan discourage development.

Depending on how much the proposed critical habitat designation contributes to additional environmental studies, project delays, project modifications, and potential project denials, the cost ranges from insignificant to substantial. However, information is insufficient to meaningfully quantify potential additional costs to developers, landowners and government agencies.

4.g. Reduced Property Values

4.g.(1) General Factors Underlying Reduced Property Values

An issue often raised by private landowners is that their property may lose value with critical habitat designation. They are concerned that the designation will make their land less desirable by restricting its potential use or its development potential, or by increasing landowners' land-management or development costs.

Reduced property values need not be based in fact. Perceptions of the economic impact of critical habitat designation can result in a temporary loss in property value if landowners or buyers believe that the designation will restrict land uses, require modifications to the property, or cause project delays or other problems. Such a loss in property value can be experienced for as long as the perceptions persist.

Similarly, uncertainty about the impact of a critical habitat designation can cause a temporary reduction in land value that will continue until clear and correct information is distributed. To reduce the uncertainties, landowners may feel it necessary to retain counsel, land surveyors, biologists, and other specialists to determine the implications of the designation on their property. This can be particularly important for landowners who plan to sell their property and so must address concerns of potential buyers.

4.g.(2) Potentially Affected Properties and Impacts on Property Values

The concern of landowners about reduced property values primarily involves land that is: (1) privately owned; (2) in the State's Urban, Rural or Agricultural District; and (3) suitable for eventual development or commercial use based on access, gentle slopes, proximity to infrastructure and services, etc.

However, only a few such properties are proposed for critical habitat designation. There is no land in the Rural District proposed for critical habitat designation, and as noted in Chapter I, Section 2, the acreage that is in the Urban District does not contain the *primary constituent elements* and is therefore excluded from the critical habitat designation. Most of the remaining land is: (1) owned by government; (2) in the Conservation District; and (3) not suitable for development due to poor access and difficult terrain.

After considering the above adjustments, privately-owned land in the Agricultural District proposed for critical habitat includes the following: 757 acres in Unit A1, 450 acres in Unit A2, 101 acres in Unit E1, 821 acres in Unit E2, about 1,637 acres in Unit F, and 4,901 acres in Unit G (see Table I-1). Much of this land is in remote areas, and all of it is categorized as "agricultural" by the county. None of these lands are likely to be subject to development pressures or significant changes in use in the foreseeable future.

The Moloka'i Community Plan emphasizes that a slow and cautious approach to future development is preferred, and to that end, contains a planning standard for development in the Agricultural District, requiring a minimum lot size of 25 acres for subdivisions having four or more lots. In addition, the Community Plan proposes expanding the Special Management Area boundaries to the entire island, except DHHL property and Kalawao County, which would add an additional layer of review for future development on Moloka'i.

In this context, any decrease in property value due to critical habitat designation is expected to be small—at least in theory and assuming fully informed buyers and sellers. Nevertheless, perceptions could contribute to a more significant reduction in property values. The worst-case scenario—and one that is not expected over the long term—would be a perception among potential buyers that the land should be valued as if it were subject to the same restrictions as land in the Conservation District. In this case, as noted in previous subsections, a decrease in property value would be expected, but information is insufficient to determine the precise amount of the decrease. Moreover, ensuring that clear and correct information is available to all landowners and prospective purchasers will further reduce the potential for such a scenario.

4.h. Condemnation of Property

Some landowners suspect that, following critical habitat designation, the Service eventually will condemn private property at depressed land values. However, the Service is not proposing nor is it contemplating purchasing any land being proposed for critical habitat designation.

On occasion, the Service does purchase land (e.g., land for a wildlife refuge). But this would be a separate action from critical habitat designation. As such, any proposed land purchase should be evaluated at the time the particular project is proposed, and should be based on what is actually proposed. When the Service does purchase private property, the normal practice is to do so only when (1) the landowner is willing to sell the land, and (2) the price and other terms are acceptable to the landowner.

4.i. Costs to Investigate Implications of Critical Habitat

Many of the private landowners may hire attorneys or use their own professional staff to investigate the implications of critical habitat designation on their property. They may want to learn how the designation may affect (1) the use of their land (either through restrictions or new obligations), and (2) the value of their land.

On Moloka'i a total of 25 private landowners are included in the proposed critical habitat designation. While a few may be familiar with the Act, this analysis assumes that most, or all, of them will investigate the potential impacts on their properties.

An estimate of the costs involved with this investigation ranges from $53,000 to $162,500. This estimate is based on the following assumptions: (1) 20 to 25 landowners will investigate the implications of critical habitat; (2) the landowner and/or his attorneys or professional staff will spend about 15 to 25 hours on the investigation at rates of $150 to $200 per hour; and (3) Service staff will spend four to 10 hours at $100 to $150 per hour responding to inquiries from each landowner.

Because this cost is incurred by landowners to reduce uncertainty about the impacts of the designation, it is solely attributable to critical habitat.

4.j. Reduced Cooperation on Conservation Projects

Some parties have expressed concern that the ongoing activities of the Service to designate critical habitat could cause some landowners to cooperate less with the Service, NRCS, and DLNR on conservation projects. By not cooperating, the landowners may hope to avoid having listed species discovered on their lands or having their lands identified as favorable habitat for listed species.

Reduced cooperation from landowners which, in fact, has occurred in Hawai‘i on occasion, may include refusal to allow biological surveys of their land, or refusal to participate in watershed and conservation partnership programs sponsored by the Service, NRCS and DLNR. Reduced cooperation could result in lower-quality land management, environmental degradation, and increased risks to native plants and wildlife. If the environmental changes were valued, they could reflect an economic loss to society.

Any change from the current level of cooperation from landowners will depend on how much land is designated, which land is designated, actual and perceived restrictions on land use and development due to the designations, and perceived risks in the future. The assessment would be based on experiences in Hawai'i as well as in other states.

For the listed plants on Moloka‘i, the proposed critical habitat designation is expected to have a modest impact on land use and development over and above existing restrictions. This is especially true for land in the Conservation District, which accounts for 66 percent of the proposed critical habitat. As landowners gain experience with the actual effects of critical habitat, their concerns about whether or not to cooperate on conservation projects may diminish.

Nevertheless, the proposed area is relatively significant—amounting to 26 percent of Moloka‘i —and includes some privately owned land in the Agricultural District. As a result, a modest but undetermined reduction in cooperation may occur, along with a corresponding but undetermined environmental loss to society.

5. POTENTIAL IMPACTS TO SMALL ENTITIES

5.a. Regulatory Flexibility Act

Under the Regulatory Flexibility Act (RFA) (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.

SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

This analysis determines whether this critical habitat designation potentially affects a "substantial number" of small entities in counties supporting critical habitat areas. It also quantifies the probable number of small businesses likely to experience a “significant effect.” While SBREFA

does not explicitly define either "substantial number" or "significant effect,"[17] the Environmental Protection Agency and other Federal agencies have interpreted these terms to represent an impact on 20 percent or more of the small entities in any industry and an effect equal or greater than three percent or more of a business' annual revenues.[18] In both tests, this analysis conservatively examines the total estimated section 7 costs calculated in earlier sections of this report, including those impacts that may be "attributable co-extensively" with the listing of the species.

5.b Impact on Small Entities

As noted earlier in this chapter, the analysis performs a survey of all potential activities and entities that may be affected the critical habitat designation. Based on this survey, the analysis identifies the following entities as being affected by the designation (activities are noted in parentheses):

- National Park Service (Kalaupapa National Park management)
- Federal Emergency Management Agency (emergency response activities)
- State DLNR (game management and Ilio Point restoration)
- State DOA (agriculture activities)
- State DOT (road widening)

- East Moloka'i Watershed Partnership (conservation activities)
- Ranching operations (conservation activities)

Some of these entities do not fit the description of "small entities" as developed by the Small Business Administration:

(1) Federal government agencies (i.e., National Park Service and FEMA) are not small businesses under SBA guidelines.

(2) The RFA/SBREFA defines "small governmental jurisdiction" as the government of a city, county, town, school district, or special district with a population of less than 50,000. However, State governments are considered independent sovereigns, not small governments. As such, DLNR, the State DOA, and the State DOT would not be considered "small entities".

Given these adjustments, the primary projects and activities that might be affected by the proposed designation that could affect small entities include ranching operations and conservation projects. As mentioned in Section 3 above, one ranching operation is likely to enter into two section 7 consultations with the Service, and another one or two ranching operations may enter into a section 7 consultation with the Service within the next 10 years.

---

[17] Regulatory Flexibility Act, 5 U.S.C. 601 et. seq.

[18] See U.S. Environmental Protection Agency, *Revised Interim Guidance for EPA Rulewriters: Rgulatory Fexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act*, March 29, 1999.

In 2000, there were 170 cattle livestock operations in Maui County. The combined cattle sales of all of these operations in 2000 was about $3.2 million (Statistics of Hawaii Agriculture, 2000). Since this implies average annual cattle sales per business of $19,000, it is likely that all or almost all of the Maui County cattle operations, including those on Moloka'i, meet the definition of a small business (annual sales less than $750,000). Thus, the critical habitat designation may affect two to three businesses out of 170 (one to two percent) of the small businesses in the cattle industry in Maui County.

As mentioned earlier in this chapter, one community organization is likely to enter into section 7 consultation for coastal strand restoration due to the receipt of funding from the Service. Because the Service is also the funding entity and will likely provide technical assistance to the organization, the impact on this organization is minimal. In addition, the consultation would have occurred regardless of designation of critical habitat. For these reasons, the proposed critical habitat designation is not likely to affect small community organizations.

Based on the above analysis, a significant economic impact on a substantial number of small entities will not result from the proposed critical habitat designation. However, even though the proposed designation would not affect a "substantial" number of small businesses in each industry, an estimate of the impact is provided below.

The cost of consultations with Pu'u o Hoku Ranch is $15,300 to $25,800 (Section 3.d., Table VI-3). The cost of the consultations with one to two unknown ranching operations is $9,700 to $41,200 (Section 3.c., Table VI-3). These costs reflect costs to the Service and NRCS to participate in the consultations; in general, none of the consultation costs are absorbed by the rancher. The estimated cost of consultations with Hui Malama o Mo'omomi is $5,200 to $10,400 (Table VI-3). Again, these costs reflect costs to the Service to conduct the consultation.

6. SECTION 7-RELATED ECONOMIC BENEFITS

6.a. Introduction

Critical habitat designation is likely to provide economic benefits to the region, as well as to society as a whole. These benefits fall into two categories. Direct benefits are those directly attributable to the activities associated with compliance with the habitat designation, while indirect benefits arise from preservation of threatened and endangered species and other environmental improvements encouraged by critical habitat designation. Direct and indirect economic benefits may be manifested in two ways: changes in regional economic activity and changes in social welfare.

Regional economic and social welfare measures represent alternate ways to view the benefits of critical habitat designation. Regional economic benefits refer to an increase in revenues or employment in a given area. Changes in regional economic activity are an important aspect of policy and project evaluation because the costs of certain actions may be more concentrated among regional residents than are the benefits. From a national perspective, however, increases in activity in the region reflect a redistribution of activity from another geographic area, not a net increase in national economic activity. The exception is inflow from non-domestic sources.

"Social welfare benefits" are measured by individuals' "willingness to pay." The sum of an individual's willingness to pay for something, less the costs associated with its consumption, is referred to as consumer surplus. Consumer surplus is the standard metric used to evaluate alternate allocations of society's resources, as in cost-benefit analysis of environmental programs. While one

might argue that local residents are the primary beneficiaries, to the extent that a critical habitat designation enhances the nation's stock of natural assets, the benefits associated with the designation flow to society at large.

However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Moloka'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms. It is not intended to provide a comprehensive analysis of the benefits that could result from section 7 of the Act in general, or of critical habitat designation in particular. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected costs of the rulemaking.

6.b. Direct Benefits

6.b.(1) Regional Economic Benefits

Regional Economic Activity Generated by Conservation Management

In FY 2001, the Service spent an estimated $95,000 on conservation management for listed plants in Moloka'i, including expenditures on salaries, equipment, supplies and services. In turn, workers and companies that benefited from the Service's expenditures on conservation management purchased additional goods and services, thereby generating additional economic activity (referred to as the multiplier effect). In total, the initial Service expenditure generated approximately $200,000 in direct and indirect sales for the year on Moloka'i and other islands, and supported about three jobs in Hawai'i (based on multipliers from the Hawai'i Input-Output Model, DBEDT, 1998).[19] The State and other organizations also spend a considerable amount on conservation management that involves listed plants in Moloka'i (e.g., State expenditures to manage NARs).

If the proposed critical habitat results in an increase in conservation management activities in Moloka'i, associated expenditures may increase economic activity in Hawai'i. Based on the input-

[19] The Hawai'i Input-Output Model is an economic forecasting tool that can be used to estimate the "ripple effect" of changes in regional expenditures. That is, as dollars are spent in or withdrawn from a particular sector of the economy, not only is that sector affected directly but also the other sectors that supply goods and services to it are affected indirectly. The magnitude of this "ripple effect" is captured by estimates known as "multipliers". For example, a multiplier of two indicates that $1 worth of expenditures in a particular sector is responsible for an overall contribution of $2 to the local economy. It is important to note that "direct" and "indirect" in the context of input-output modeling refer to primary and secondary changes in sales and employment associated with expenditures. They do not, in this context, distinguish direct from indirect costs or benefits, as discussed in the introduction.

output multipliers, each additional $1 million spent in Hawai'i would generate approximately $2.1 million in direct and indirect sales in Hawai'i, and would support approximately 35 direct and indirect jobs. Thus, if all of the 28,000 acres of mountainous land in Moloka'i that is proposed for critical habitat designation were to be managed at an average cost of $30 per acre (which is not expected unless mandated by a court order), then the resulting expenditure of about $840,000 per year would generate roughly $1,764,000 per year in direct and indirect sales in Hawai'i, and would support about 29 direct and indirect jobs. However, to the extent that these areas are already under conservation management, these estimates may overstate the actual costs.

It is important to note, however, that expansion of Hawai'i's economy through these expenditures is contingent upon how they are financed. If the increase in conservation management is financed by an influx of new funds from outside the State, then the increase in expenditures will contribute to increased economic activity in Hawai'i. New funding for conservation management could come from the Federal government, grants from non-profit organizations outside Hawai'i, or other sources. While this is possible, no known projections are available that indicate a significant increase in funding for conservation management from outside Hawai'i due to the proposed critical habitat designation.

If increased expenditures on conservation management are funded from within Hawai'i, or through funds from outside sources already intended for use in the State, there would be no significant change in economic activity. Similarly, as discussed in the introduction, increased funding of conservation programs in Hawai'i would result in no significant change in national economic activity for the economy as a whole because any funds spent in Hawai'i would be at the expense of expenditures elsewhere (e.g., funds diverted from some other Federal program).

Regional Economic Activity Associated with Ecotourism

Commercial ecotours, via foot hikes, mule and horseback riding, and kayaking and led by guides featuring Moloka'i's unique ecosystems and endemic plants, are offered in portions of the proposed critical habitat. These may include guided tours into Kalaupapa National Historical Park (Units A2, B1), hiking tours in the Forest Reserve (Units B1, C, F and G), kayaking tours along the north shore sea coast (Unit D, B1), and hiking tours to the Mo'omomi coastline (Unit A1, A2). Designation could benefit these operations by providing a marketing dimension that enhances the appeal of the ecotours to visitors. However, this benefit is expected to be slight inasmuch as these areas are already regarded as being special due to their existing natural and cultural resources. In addition, in most if not all cases, the Service prefers that these commercial operations do not feature visits to view threatened and endangered plants since revealing their locations increases the risk that a species may be collected or damaged or its habitat harmed.

Regional Economic Activity Associated with Avoided Costs to Developers

The main advantage to developers of critical habitat designations is to provide them with more information regarding project siting. For example, knowledge of critical habitat boundaries can help developers avoid facing issues related to listed species. In the future, this may reduce delays and resultant revenue impacts associated with project modifications.

6.b.(2) Social Welfare Benefits of Habitat Designation

Critical habitat designation could also generate direct social welfare benefits. For example, economic literature has demonstrated individuals' willingness-to-pay for preservation of open space,

both in general, as well as specifically in the vicinity of their residence. Similarly, a survey sponsored by the Trust for Public Land and conducted in April 2000, revealed the approximate amount that Maui County voters were willing to pay to better protect open space, wildlife habitats, recreational areas, and land around rivers and streams. According to the survey, approximately 66 percent of the voters would support a "community lands and open space preservation fund" to protect land and water in Maui County, and funded by a 2.5-percent increase in the property tax. This works out to a total of about $1.38 million per year (based on estimated property-tax revenues of $83.4 million in FY 2000 x 2.5 percent x 66 percent), or an average of about $11 per resident per year (based on a county population of 128,100 in 2000). Thus, to the extent that designation results in preservation of open lands that might otherwise be developed, some welfare benefits may be created. However, the proposed critical habitat is already kept as open space. As such, these benefits are likely to be insignificant.

6.c. Indirect Benefits

6.c.(1) Social Welfare Benefits of Endangered Species Preservation

The primary purpose of critical habitat is to protect areas that are needed to conserve threatened and endangered species. Many economic studies have demonstrated social welfare benefits associated with the conservation and recovery of endangered and threatened species (e.g., Bishop 1978 and 1980; Brookshire and Eubanks, 1983; Boyle and Bishop, 1986; Hageman, 1985; Samples *et al*., 1986; Stoll and Johnson, 1984). Most research in this area has focused on mammals, birds, and fish. Depending upon the species, this literature indicates that households are willing to pay between $6 and $70 per year for species conservation, or one-time payments up to $216 (bald eagle, Loomis and White, 1996). These values may be motivated by expectations of future viewing opportunities, or a desire to preserve important natural resources for future generations.

Willingness-to-pay for a single species of endangered plant is likely to be lower than these amounts, particularly if the species is not well known to the general public. Few studies have focused on the value of preserving endangered plants and, given the scope of this analysis, no primary economic research was conducted on the value of species preservation. It is important to note, however, that some of these plant species have particular significance in an ethnobotanical context; that is, they are found in historical plant lore and in the agricultural customs of Native Hawaiians.

However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Moloka'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms.

Some landowners have argued that critical habitat would make little or no contribution to the ultimate conservation of Hawai'i's threatened and endangered plants. They observe that many of these native plants are vulnerable because they are weaker and more fragile than non-native plants,

and they grow more slowly. In particular, native plants lack the natural defenses (e.g., thorns, bitter tastes, offensive odors, etc.) to protect them from non-native pests (insects, diseases, rats, nematodes, birds, grazing animals, etc.), a vulnerability that reflects the fact that native plants evolved in isolation in a benign environment. Finally, many of the native plants cannot compete against aggressive fast-growing exotic plants, particularly when they are stressed, such as during droughts. In the long term, some argue that many listed plants will not be able to survive in the wild, with or without critical habitat designations. Nevertheless, critical habitat designations are mandated by law. And as long as these designations enhance the probability of the survival and conservation of listed species, regardless of how small that probability, critical habitat has value.

6.c.(2) Social Welfare Benefits of Broader Ecological Improvements

As discussed above, the survival and conservation of Hawai'i's native plants will require controlling feral ungulates. It is also recognized that ungulates cause additional environmental problems. Their browsing, digging, and trampling contribute to a loss of native habitat which, in turn, contributes to the loss of listed birds and other native birds, the endangered Hawaiian bat, and snails and insects that are either currently listed or are candidates for listing. Also, mosquitoes hatched in pig wallows frequently carry avian malaria and pox that contribute to the decline of native bird populations. Furthermore, certain ungulates (especially sheep and goats) can remove vegetation to such an extent that erosion becomes a major issue. In turn, the loss of vegetation can degrade watersheds, and the soil run-off can increase silt in streams thereby harming aquatic life; create layers of mud on otherwise sandy beaches; and bury near-shore reefs, thereby harming marine communities. Adverse impacts are more severe for bays and other protected marine environments that are not flushed by strong ocean currents.

In this manner, if feral ungulate control were undertaken for purposes of critical habitat, some complementary environmental improvements may be expected. These improvements may in turn improve ecosystem health and contribute to the welfare of residents and visitors. Similar to the benefits of species preservation discussed above, welfare benefits have also been ascribed to preservation of general biodiversity and ecosystem function (e.g., Pearce and Moran, 1994). However, determining the nature and extent of improvements specifically attributable to critical habitat designations would be difficult, if not impossible. For this reason, coupled with a lack of existing economic research, these potential broader ecological benefits are not quantified.

7. SUMMARY OF ECONOMIC IMPACTS

For economic activities affected by the proposed plant critical habitat in the next 10 years, Table VI-3 summarizes the total section 7-related costs and benefits attributable to the plant listings, as well as those which are attributable solely to the proposed critical habitat designation.

These findings reflect the fact that very few new developments, commercial projects, land uses, and activities are expected in the 10 proposed critical habitat units. This is due to (1) lands that are largely unsuitable for development and most other activities because of their rugged mountain terrain, lack of access, and remote locations; and (2) existing land-use controls that severely limit development and most other activities in much of the proposed designation. Also, a number of projects and activities in the proposed critical habitat would not be subject to section 7 consultation because there is no *Federal involvement,* or the activities involve O&M of existing man-made features and structures, or the projects or activities would not impact the *primary constituent elements* essential to the survival and conservation of the plants.

Thus, as shown in Table VI-3, the total section 7-related costs associated with the plant species listings are $162,070 to $967,250, while those attributable solely to the critical habitat designation are $147,720 to $853,150. These costs represent, in the worst case, about .03% of the total personal income of Maui County in 1999. In addition, indirect costs could add more to the totals.

Designation of the proposed critical habitat and related actions taken to control threats to the plant species (e.g., ungulate control) may also generate economic benefits. These benefits may be related directly or indirectly to designation and manifest in increased regional economic activity or social welfare. For the former, to the extent that critical habitat designation leads to additional conservation management activities funded by out-of-state sources, a local increase in revenues and employment may result. For the latter, species preservation and recovery and other complementary ecological improvements may generate social welfare benefits for residents and non-residents alike. However, the development of quantitative estimates associated with the benefits of the proposed designation is impeded by the scarcity of available studies and information relating to the size and value of beneficial changes that are likely to occur as a result of listing a species or designating critical habitat. In particular, the following information is not currently available: 1) quantified data on the value of the Moloka'i species; and 2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation (for example, how many fewer ungulates will roam into the critical habitat, how many fewer invasive plants will be introduced as a result, and therefore how many more of the endangered plants will be present in the area). As a result, it is not possible, given the information that is currently available, to estimate the value associated with ecosystem preservation that could be ascribed to critical habitat designation. Thus, categories of benefits are discussed in qualitative terms.

Table VI-3. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 COSTS					
Management of Game Hunting					
State-Managed Lands, Consultations	$ 770	$ 12,650	$ 220	$ 5,750	Consultation due to Pittman-Robertson funding
State-Managed Lands, PMs	$ 17,600	$ 148,000	$ 13,200	$ 111,000	Based on prior PMs
National Parks					
Kalaupapa National Park, Fencing Consultations	$ 15,600	$ 15,600	$ 15,600	$ 15,600	Consultation due to National Park Service involvement
Kalaupapa National Park, Fencing PMs	Minor	Minor	Minor	Minor	PMs, if any, would be minor due to beneficial nature of project
Kalaupapa National Park, Consultation for Possible Landfill Relocation	$ 8,900	$ 19,400	$ 8,900	$ 19,400	Consultation due to National Park Service involvement
Kalaupapa National Park, Landfill PMs	Minor	Minor	Minor	Minor	PMs, if any, would be minor due to small size and early stages of project
Conservation Projects					
East Molokai Watershed Partnership, Consultations	$ 5,200	$ 65,500	$ 5,200	$ 5,200	Consultation due to likely Fed funding and Service involvement in the East Molokai Watershed Partnership
East Molokai Watershed Partnership, PMs	None	None	None	None	
Hui Malama o Moomomi, Consultations	$ 5,200	$ 10,400	$ 1,000	$ 5,700	Consultation due to possible Service funding
Hui Malama o Moomomi, PMs	None	None	None	None	
Ilio Point, Consultations	$ 5,200	$ 5,200	$ -	$ -	Consultation due to possible Service funding
Ilio Point, PMs	None	None	None	None	
Wildlife Habitat Incentives Program, Consultations	$ 5,200	$ 47,100	$ 5,200	$ 47,100	Consultation due to NRCS (DOA) funding
Wildlife Habitat Incentives Program, PMs	None	None	None	None	

Table VI-3. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT SECTION 7 COSTS (cont'd)					
Agriculture and Ranching Operations					
Puu o Hoku Ranch, Consultations	$ 15,300	$ 25,800	$ 15,300	$ 25,800	Consultation due to Fed funding and designation of critical habitat
Puu o Hoku Ranch, PMs	$ -	$ 177,900	$ -	$ 177,900	PMs could involve canceling existing NRCS contracts
Other Ranching Operations, Consultations	$ 9,700	$ 41,200	$ 9,700	$ 41,200	Consultation due to Fed funding
EQIP or CRP funded projects, PMs	$ -	$ 100,000	$ -	$ 100,000	PMs could involve foregoing Fed funding
Real Estate Development					
Development within Agricultural District	None	None	None	None	No projects planned in CH and no Fed involvement
Enterprise Community Activities, Consultations	None	None	None	None	No projects planned in CH
Water Systems					
Molokai Irrigation System	None	None	None	None	No projects planned in CH
Molokai Ranch Water System, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures. Also no Fed involvement
Communications Facilities					
New Facilities, Consultations	$ 7,500	$ 9,100	$ 7,500	$ 9,100	Consultation due to FCC and FAA permits
New Facilities, PMs	$ -	$ 100,000	$ -	$ 100,000	Could include moving the site
Trails and Roads					
Unpaved Roads within State Forest Reserve, Consultations	None	None	None	None	No consultation for O&M of existing man-made structures.
Unpaved Roads outside State Forest Reserve, Consultations	None	None	None	None	No consultations required since no Fed involvement
Paved Road Widening, Consultations	$ 8,900	$ 19,400	$ 8,900	$ 19,400	Consultation due to Fed funding
Paved Road Widening, PMs	None	None	None	None	No PMs anticipated because remaining in already disturbed area
Power Transmission Lines, Consultations	None	None	None	None	No projects planned and no Fed involvement
U.S. Military Activities, Consultations	None	None	None	None	No planned military activity in CH
Ecotourism, Consultations	None	None	None	None	No consultation required since no Fed involvement
Natural Disasters					
Recovery Projects, Consultations	$ 4,000	$ 7,500	$ 4,000	$ 7,500	Consultation due to FEMA funding
Recovery Projects, PMs	Minor	Minor	Minor	Minor	Few adverse impacts anticipated

Table VI-3. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
INDIRECT COSTS					
Management of Game Mammals and Loss of Hunting Lands	Minor	Minor	Minor	Minor	Slight probability of a major impact
Conservation Management	Minor	Minor	Minor	Minor	No obligation to proactively manage lands to control threats, but an undetermined probability of a major impact
Subsistence and Native Hawaiian Traditional and Cultural Practices	Minor	Minor	Minor	Minor	Undetermined, but slight, probability of a major impact
Redistricting of Land by the State	Small	Small	Small	Small	Small probability of significant impacts
State and County Development Approvals	Modest	Modest	Modest	Modest	Few anticipated projects, but costs to projects range from insignificant to substantial
Reduced Property Values	Modest	Modest	Modest	Modest	Decrease in property value expected to be small, but perceptions could contribute to more significant reduction
Condemnation of Property	None	None	None	None	No condemnation resulting from CH. Also, the Service acquires land by negotiation, not condemnation
Investigate Implications of CH	$ 53,000	$ 162,500	$ 53,000	$ 162,500	25 private landowners may investigate the implications of CH on their lands
Reduced Cooperation on Conservation Projects	Modest	Modest	Modest	Modest	Some landowners want to avoid CH designation

Table VI-3. Section 7 Costs & Benefits Attributable to the Plant Listings & Critical Habitat
(10-year estimates)

CH = critical habitat PMs = project modifications O&M = operation and maintenance Fed = Federal ne = not estimated

Item	Total		Share to CH		Explanation
	Low	High	Low	High	
DIRECT BENEFITS					
Regional Economic Activity Generated by Conservation Management	Minor	Minor	Minor	Minor	Much of the benefit likely accrued elsewhere if financed with off-island sources
Regional Economic Activity Associated with Ecotourism	Minor	Minor	Minor	Minor	The Service prefers that guides do not feature visits to endangered plants
Regional Economic Activity Associated with Avoided Cost to Developers	Minor	Minor	Minor	Minor	Helps developers site projects
Social Welfare Benefits of Habitat Designation	Minor	Minor	Minor	Minor	The designation may result in preservation of open lands
INDIRECT BENEFITS					
Social Welfare Benefits of Endangered Species Preservation	ne	ne	ne	ne	Difficult to estimate preservation benefits and their value
Social Welfare Benefits of Broader Ecological Improvements	ne	ne	ne	ne	Difficult to determine environmental improvements attributable to the implementation of section 7
TOTAL					
Costs Over 10 Years	**$ 162,070**	**$ 967,250**	**$ 147,720**	**$ 853,150**	Figures exclude costs of undetermined probabilities
Benefits Over 10 Years	**ne**	**ne**	**ne**	**ne**	Difficult to estimate

APPENDIX VI-A

Information on Hunting and Game-Mammal Management

1. INTRODUCTION

Presented below is background information on hunting on Moloka'i and DLNR's game-mammal management. The material is used in Chapter VI in addressing direct and indirect economic impacts of critical habitat on game-mammal management. Subjects addressed include the following: hunting activity on Moloka'i, economic activity associated with hunting, the value of hunting to hunters, DLNR game management, the loss of hunting areas to the *palila* critical habitat, information on the Pittman-Robertson Act, consultation with the Service on Pittman-Robertson projects, and recent changes in hunting fees.

2. HUNTING ACTIVITY ON MOLOKA'I

Hunting is an important activity for Moloka'i, because it provides recreation, subsistence, and a desired lifestyle. Subsistence hunting is particularly important on Moloka'i because of the rural lifestyle and the high level of unemployment in some areas. Hunting is largely a local activity, with approximately 5 percent of the game-mammal hunters coming from off-island (based on DLNR estimates, 2001). However, the creation of a DLNR website about hunting in Hawai'i has increased phone calls from potential visitors requesting additional information about hunting on Moloka'i.

Game mammals hunted on the island include feral pigs, goats and axis deer. Game birds include ring-necked pheasant, Francolin (two species), chukar partridge, quail (two species), and dove (two species), and wild turkey.

3. ECONOMIC ACTIVITY ASSOCIATED WITH HUNTING

In 1996, 23,000 hunters in Hawai'i, most of whom were local residents, spent an estimated 258,000 days and about $16.4 million on hunting, of which about $8 million was trip-related and about $8.4 million was for equipment and other expenses (1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation). Approximately 70 percent of their hunting trips were spent hunting game mammals and the remaining trips were for game birds. Based on hunting licenses issued, about 3 percent of the State's hunters live on Moloka'i (information provided by DLNR, 2001).

Companies that supply goods and services to hunters, and the employees of these companies, in turn purchase goods and services from other companies, thereby creating even more sales, and so on. These "indirect" sales are scattered throughout the economy and the State. When both "direct" and "indirect" sales are included, total Statewide sales due to hunting in Hawai'i amounted to about $31.8 million in 1996. In turn, this economic activity supported an estimated 580 jobs and generated an estimated $13.5 million in income (an average of about $23,300 per job). These estimates are based on multipliers from the Hawai'i Input-Output Model. (DBEDT, 1998).

In 1996, economic activity supported by just game-mammal hunting on Moloka'i amounted to about $340,000 in direct sales, $670,000 in total direct and indirect sales, twelve jobs, and $280,000 in income. These figures are order-of-magnitude estimates based on 70 percent of the hunting trips being spent hunting game mammals, and 3 percent of the State's hunting activity taking place on Moloka'i.

4. VALUE OF HUNTING TO HUNTERS

The net value of hunting opportunities to hunters is based on what they would be willing to pay above and beyond their expenditures for hunting equipment, supplies, and travel to participate. "Consumer surplus" is the standard measure of value used in cost-benefit analyses. The Statewide value of all hunting for 1996 is estimated at $6.5 million, based on (1) the assumption that hunters value their experience at $25 per day; and (2) they hunted a total of 258,000 days that year. For Moloka'i, the value of just game hunting amounted to about $140,000 ($6.5 million x 70 percent x 3 percent). These figures on the value of game hunting should be interpreted as order-of-magnitude estimates, not precise estimates.

The valuation of hunting at $25 per day is consistent with estimates of the valuation of hunting from the following economic studies:

— $19.18 or $26.86 per day for hunting deer in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Donnell and Nelson, 1986)

— $22.45 or $28.50 per day hunting for jack rabbits and game birds in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Young, et al. 1986)

— $21.66 or $24.44 per day for hunting pheasant in Idaho in 1986, with the different amounts being based on methodology, but with the higher amount being deemed more accurate (Young, et al., 1986)

— $16.56 per day for hunting pheasant in Idaho in 1971 (Shulstad, 1978)

A valuation of hunting based on the market value of the meat harvested in excess of the hunters' expenditures on hunting (i.e., the subsistence value of hunting) would be lower. In effect, hunting is largely a recreational pursuit for which expenditures on equipment and travel, and the value of the time spent hunting and butchering the animals, are partially offset by the value of the meat harvested.

5. DLNR GAME MANAGEMENT

DLNR is the State agency responsible for managing game-mammal populations in State Hunting Units. However, it must carry out this responsibility in the context of two conflicting mandates: provide for sustained-yield recreational hunting in some of the State Hunting Units and protect native ecosystems and plants in other areas.

DLNR achieves what they regard as a reasonable balance between the two mandates by permitting recreational hunting based on site conditions (e.g., animal population and food supply) and habitat quality (nearly pristine, highly degraded, or somewhere in between) (see Appendix VI-

B). For example, the most liberal hunting (e.g., year-round pig hunting) is permitted in nearly pristine areas that have suffered the least environmental damage. This helps keep game-mammal populations low in these sensitive areas, thereby minimizing harm to native ecosystems and to endangered and threatened plants. However, hunting is not possible in many remote areas that are inaccessible to hunters.

In areas where the native forest is highly degraded and DLNR sees no hope that the native vegetation will return, hunting is restricted in order to sustain larger populations of game mammals (see below for the methods used to restrict hunting). When hunting is restricted, the larger populations allow hunters to harvest more animals each year than would be the case with smaller populations. In addition to the recreational benefits to hunters of having higher game harvests, reasonable numbers of game mammals are available to browse on the non-native plants and weeds, thereby helping control the seed reservoir of noxious non-native plants and their spread into other areas.

Finally, in degraded areas, exclosure fencing of small areas (of less than 2 acres) may be used to protect rare native plants and their seeds from foraging animals. These exclosures are small enough to make it practical to weed the overgrowth of aggressive alien plants which would otherwise choke out the native plants or carry a wildfire.

According to DLNR, the combined strategy of using game mammals to help control non-native plants and weeds in degraded areas and using hunters to help control ungulate populations in pristine areas is accomplished at little cost to the taxpayer while providing recreational benefits to hunters.

However, it should be noted that Service staff and expert biologists question the effectiveness of DLNR's game-management approach in protecting native forests, arguing that so long as large populations of feral ungulates are free to range, they will migrate into areas that are not degraded, possibly because they are fleeing from hunters or searching for better forage than what they can find in degraded game-production areas. In turn, their migration into these areas will contribute to the loss of listed plants and to the spread of noxious plants. Also, the State exclosures are regarded by the Service as too small to sustain viable populations of threatened and endangered plants (Service, *Recovery Plan for the Multi-Island Plants*, 1999).

The methods employed by DLNR to manage game-mammal populations take advantage of the fact that the demand for hunting opportunities exceeds the availability of game mammals. Within each State Hunting Unit, DLNR controls the amount of hunting activity by using such restrictions as: bag limits, hunting method (rifle, muzzleloader, bow and arrow, dogs and knives); days allowed (week-ends only), hunting seasons; hours of the day; and for some areas, a limit on the number of daily permits issued (Hawai'i Administrative Rule, Title 13, Chapter 123). However, hunting activity falls off if hunters' success rates are low (which usually occurs when too many hunters are after too few animals) or if certain areas are difficult to access. Also, some of the hunting restrictions are for safety purposes: limiting the number of hunters prevents dangerous overcrowding and risks to both hunters and other recreational users in the area (e.g., hikers and campers).

If the game-mammal surveys indicate that the game-mammal populations have become too high for an area, DLNR responds by allowing more hunting. But if increased hunting does not reduce the population sufficiently—possibly because of difficult access to a remote area—then DLNR may direct staff to remove the animals where economically feasible.

To provide guidance for adjusting the controls on hunting activity, DLNR monitors the following: (1) hunting activity (including the number of hunting trips, game harvests by type of game, and success rates); (2) game populations (using habitat transects, harvest data, hunter reports, and aerial and ground surveys); and (3) vegetation (including the coverage, composition by type of plant, invasion by non-native plants, trends, comparisons with vegetation inside animal exclosures, and impacts to plants from game mammals). But the management of game-mammal populations is not an exact science. For example, animal population estimates may be inaccurate; populations vary with rainfall and food availability; and animals move from one area to another.

6. LOSS OF HUNTING AREA UNDER THE *PALILA* DECISION

Based on past experience, most hunters in Hawai'i associate critical habitat designation with loss of prized hunting areas. Although a parallel situation does not exist with the proposed critical habitat on Moloka'i, the association is based on the *palila* critical habitat on the Island of Hawai'i.

In 1975, the Service listed the *palila (Psittirostra bailleui),* a Hawaiian honeycreeper (a bird), as an endangered species. The *palila* depends entirely on the *mamane-naio* ecosystem—a broad band of sparse forest encircling Mauna Kea between about 7,000 and 10,000 feet elevation. In 1977, in an effort to further protect the *palila*, the Service designated the *palila* critical habitat, encompassing about 67,000 acres (105 square miles) of hunting land.

The *palila* were at risk because sheep and goats on Mauna Kea browsed on the *mamane* trees in the *mamane-naio* ecosystem, which was very destructive to the *palila's* habitat. Starting in the late 1940s, the population of game mammals was allowed to increase on the mountain to allow sustained harvest by hunters. Even after the *palila* was listed as endangered and its critical habitat was designated, DLNR continued to manage the feral sheep and goat populations at sustainable levels for hunting, causing continued harm to the *palila's* habitat.

This situation led the Sierra Club Legal Defense Fund to file a lawsuit in Federal court, *Palila v. Hawaii Department of Land and Natural Resources,* to require DLNR to remove the feral sheep and goats from Mauna Kea. The case tested the prohibition in the Act on *taking* of any endangered species of fish or wildlife, where *take* is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." At issue was whether modifying a habitat (i.e., in this case sheep browsing on *mamane* trees) may result in "harm" to a species thereby meeting the definition of "taking."

In 1979, a Federal court rendered an opinion in support of the plaintiff. Since studies showed clearly that the sheep and goats were "destroying or altering" the *palila* habitat, the court ordered DLNR to eradicate them from Mauna Kea and this was nearly achieved by 1981. The ruling did not affect the management of pigs on the mountain.

Following this case, the Service regulations defined "harm" to be "an act which actually kills or injures wildlife." The regulations further explain that "[s]uch act may include significant modifications where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Even though Hawai'i hunters may associate critical habitat designation with eradicating game animals and loss of prized hunting areas, the eradication of sheep and goats from the *palila* habitat was based on the Federal *taking* provision of the Act and not on *adverse modification* to the critical habitat. Furthermore, under Federal law, a situation similar to the *palila* habitat would not apply to

the habitat for plants since the Federal *taking* provision applies only to listed wildlife and not to plants. However, the State's endangered species act does have a *taking* provision for listed plants.

7. PITTMAN-ROBERTSON ACT

Game-management funding is provided as part of the Federal Aid in Wildlife Restoration Act, commonly referred to as the Pittman-Robertson Act. This Act was passed by Congress in 1937 to help restore the nation's wildlife following accumulated damage to forests and grasslands and extensive commercial harvesting of wildlife. Hawai'i's local hunters help fund this program, since revenues for it are derived from an 11 percent Federal excise tax on the price of sporting arms, ammunition, and archery equipment, and a 10 percent tax on handguns. Each state's share of these revenues is determined by a formula that considers the total area of the state and the number of licensed hunters in the state, subject to a minimum level of funding. Each state provides matching funds of at least 25 percent of the program costs from a non-Federal source. Also, each state specifies how the funds are to be spent, while the Service serves as an administrative check to insure that the funds are spent in compliance with the Act.

Because of its small area and population, Hawai'i receives the minimum level of Pittman-Robertson funding. For FY2001, total funding amounted to nearly $1.1 million, of which about $817,000 was federally funded and about $272,000 was State-funded. The County of Maui received about $170,000 for its game-management program plus another $50,000 for non-game programs.

8. GAME MANAGEMENT CONSULTATION HISTORY

8.a. 1995 Pittman-Robertson Consultation

In March 1995, the Service conducted an internal consultation regarding Pittman-Robertson funding for a series of DLNR projects Statewide. Projects included game bird and game mammal surveys; construction of game mammal and bird water units; mowing and clearing of vegetation from Game Management Areas; and maintenance of existing structures and features. In order to minimize impacts to listed plant species, DLNR proposed to construct exclosure fencing around listed plants; construct new game units in disturbed or previously cleared areas; survey all areas before they were cleared or mowed; and have a knowledgeable person supervise other mowing or maintenance activities to ensure that no inadvertent harm came to listed plants. With these precautions, the Service determined that the proposed projects were not likely to affect the listed species.

8.b. 2001 Pittman-Robertson Consultation

The 2001 Pittman-Robertson Statewide consultation required approximately one man-month of the Service's time, and 60 man-days of the State's time. Based on current salaries and benefit levels, administrative time, and overhead costs, the time spent in consultation cost the Service about $15,600 and the State about $12,000.

During consultation, the Service approved with some modification 65 of 67 game-management projects proposed by DLNR. The Service determined that the two remaining projects could adversely affect listed species. One concerned hunter check stations and game-mammal surveys on Kaua'i. In this case, the Service requested assurances from DLNR that information collected from check stations and surveys would not be used to maintain or enhance free-ranging game-mammal populations that could adversely affect federally listed species. For all islands,

except Kaua‘i and Lana‘i, DLNR provided the necessary assurances and the Service concluded that these projects were not likely to adversely affect listed species. For Kaua‘i, DLNR chose to withdraw the project from consideration rather than (1) modify it to avoid adverse impacts to listed species, or (2) pursue a formal consultation.

The second exception concerned a portion of a project that involved leasing 30,000 acres on Lana‘i for State-managed game hunting, maintenance of hunter check stations, maintenance of game-mammal watering units, and game-mammal population surveys. Because the Service determined that funding the Lana‘i portion of this project was likely to adversely affect listed species, the Service was unable to approve it as requested. Again, DLNR opted to withdraw the offending Lana‘i portion of the project rather than (1) modify it to avoid adverse impacts to listed species, or (2) pursue a formal consultation. Modification could have involved expensive fencing to prevent game mammals from migrating into areas that support listed species.

For either or both of the two projects discussed above, DLNR could have pursued formal consultation with the Service with the possibility that they would have received a determination by the Service that the projects were not likely to *jeopardize* the continued existence of listed species and could be funded. But DLNR opted not to do so because: (1) time was too short to assemble needed information and complete the formal consultation; (2) the staff had to make fiscal and budgetary commitments; and (3) the outcome was uncertain.

Instead, DLNR elected to shift funding sources for its wildlife management projects: State monies were used to fund the Kaua‘i and Lana‘i projects mentioned above, and the remaining Pittman-Robertson funds were used for projects that were originally scheduled to be funded by the State (e.g., game-bird projects).[20] The net effect was no change in the amount of Pittman-Robertson funding provided to DLNR, and modest changes to the wildlife management projects themselves.

On Kaua‘i, DLNR elected to drop a proposed helicopter goat survey project rather than fund it entirely with State monies. The helicopter services would have cost about $4,000. No changes were required for O‘ahu projects.

The more significant changes in Maui and Hawai‘i Counties involved some new fencing and lids to protect game-bird water stations from being used by game mammals in areas having listed plants. The cost totaled about $110,000 for 29 units on Maui island, 12 units on Moloka‘i and about 70 units on Hawai‘i island (based on information provided by DLNR, 2002). These projects (1) decreased game-mammal populations in the affected areas or required separate State-funded water stations for game mammals and (2) diverted Pittman-Robertson and State funds from other projects to pay for the additional fencing, lids, and new game-mammal water stations.

Plant critical habitat designations had no role in the above decisions, however, since critical habitat had not yet been designated. The consultation between DLNR and the Service on projects proposed for Pittman-Robertson funding, modifications that were made to projects to avoid adverse impacts, and DLNR’s decisions to withdraw the Kaua‘i and Lana‘i projects and to shift funding sources among projects occurred entirely because of the presence of listed species in affected areas.

[20]DLNR is, however, planning to pursue Pittman-Robertson funding again for the Lana‘i projects.

9. HUNTING FEES

In February 2002, the Board of Land and Natural Resources increased State hunting fees which are expected to increase revenues to the State by about $200,000 per year. The additional fees will give DLNR additional money and flexibility in funding game-management projects.

APPENDIX VI-B

Resource Management Guidelines

Department of Land and Natural Resources
Division of Forestry & Wildlife

"The basis of the Division of Forestry & Wildlife's (DOFAW's) Resource Management Guidelines is the status of the native vegetation in an area. The character of the vegetation is classified as: 'Most Pristine Native,' 'Native,' 'Considerably Disturbed,' or 'Badly Degraded or Highly Altered.' The vegetation status is then considered in conjunction with public safety, public demand for specific resources, and the effect of the proposed use on the vegetation.

Potential game management strategies have been divided into four categories, called Game Animal Management Classifications. These are:

— Game Production. Game is a primary objective. Areas are managed for public hunting on a sustained-yield basis. Habitat may be manipulated for the purpose of increasing or maintaining the game carrying capacity of the habitat. Hunting seasons and bag limits are set to provide sustained public hunting opportunities and benefits. Some of the Game Management Areas are in this class.

— Mixed Game and Other Uses. Production of game is an objective integrated with other uses such as hiking, production of forest products, and protection of native resources. Game populations are managed to acceptable levels using public hunting. Habitat manipulation for game enhancement may be conducted, but only when it is consistent with other uses. Seasons and bag limits are designed to ensure compatibility with other uses. These areas include portions of forest reserves and some Game Management Areas.

— Game Control. Protection of resources is the primary objective, with emphasis on native plant community and watershed protection. Hunting is used to reduce animal impacts to those resources. Bag limits or seasons are liberal. These areas include watershed areas, portions of forest reserves, Natural Area Reserves, and wilderness preserves.

— Staff Control. Areas designated for animal removal by staff or agency designees because of remoteness, environmental sensitivity, or public safety. Game mammal control is the objective. Control actions can include but are not limited to staff shooting or animal translocation. These areas include portions of forest reserves, Natural Area Reserves, wilderness reserves, and plant and wildlife sanctuaries.

Under DOFAW's Resource Management Guidelines, maintaining game bird populations is considered compatible with other uses in most areas. Game birds are managed for 'Game Production' or 'Mixed Game and Other Uses' in most areas.

Because of potential detrimental effects of game mammals on native ecosystems, management strategy for game mammals is more complex. Areas managed for game mammal production; i.e., 'Game Production,' are located primarily in areas classified as 'Badly Degraded or Highly Altered.' These areas have a preponderance of weedy species, contain very few native plants, and are managed to produce game animals for recreational hunting. Under this management approach, known individuals or populations of listed plants are fenced or otherwise protected from feral ungulates. Areas classified as 'Predominantly Native' and 'Considerably Disturbed' are managed as 'Mixed Game and Other Uses' for game mammals and have seasons and bag limits designed to ensure compatibility with other uses, including native ecosystem protection. Areas classified as 'Most Pristine Native' are managed for 'Game Control or Staff Control' and have the most liberal hunting seasons to minimize the pressure of feral animals on native ecosystems."

Hawai'i Department of Land and Natural Resources
Undated

REFERENCES

Bier, James A. Map of Maui. University of Hawai'i Press, Honolulu, Hawai'i. 1997

County of Maui. "Revenue and Expenditure Summary – FY 2001 County Funds."

County of Maui. Department of Finance, Real Property Tax Division. Real Property Tax Assessment information. 2002. Website: http://www.mauipropertytax.com/ProcessSearch.asp?cmd=Home&cp=2&tp=2

County of Maui. *Moloka'i Community Plan*. 2001.

County of Maui. *Moloka'i Community Plan*. 1984.

DeLorme. *Hawai'i Atlas & Gazetteer, Topo Maps of the Entire State, Guide to Outdoor Recreation.* Yarmouth, Maine. 1999.

Donnelly, Dennis M., and Louis J. Nelson. "Net Economic Value of Deer Hunting in Idaho." *USDA Forest Service Resource Bulletin RM-13.* Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 1986.

Fairbank, Maslin, Maullin & Associates, and Qmark Research & Polling. "Highlights of Maui County Voter Survey." For The Trust for Public Land. Mary 30, 2000.

Friendly Isle Realty. "Kawela Plantation Sales Information." April 18, 2002. http://www.molokairealty.com/kpa.htm

Hawai'i Agricultural Statistics Service. *Statistics of Hawai'i Agriculture.* Hawai'i Department of Agriculture, Agricultural Development Division and U.S., Department of Agriculture, National Agricultural Statistics Service. Annual.

Hawai'i Ecotourism Association. "Location." April 18, 2002. http://www.hawaiiecotourism.org/island.htm

"Hawai'i Fishing News" (hunting articles). Honolulu, Hawai'i. Monthly.

Hawai'i Supreme Court. *Public Access Shoreline Hawai'i v. Hawai'i County Planning Commission*. 79 Haw. 425 (1995), *cert. denied*, 517 U.S. 1163 (1996).

Honolulu Star Bulletin. "Mink Drops Pursuit of National Park on Molokai." August 30, 2001.

Institute of Social and Economic Research and Industrial Economics, Inc. *Economic Assessment of Bristol Bay Area National Wildlife Refuges: Alaska Peninsula/Becharof Izembek Togiak Final Draft.* Cambridge, MA. 1998.

Jokiel, Paul, et al. Coral Reef and Assessment Monitoring Project. *The Development, Implementation and Summary Findings of the Hawai'i Coral Reef Assessment and Monitoring Program: Three Year Summary, 2002.* February, 2002.

Juvik, J.O. And S. P. Juvik, University of Hawai'i—Hilo, Department of Geography. *Mauna Kea and the Myth of Multiple Use Endangered Species and Mountain Management in Hawai'i.* Mountain Research and Development, Vol. 4, No. 3, pp. 191-202, Hilo, Hawai'i. 1984.

Kaiser, Brooks, and Nancy Krause, Dee Mecham, Jessica Wooley and James Roumasset. *Environmental Valuation and the Hawaiian Economy* (Draft). Honolulu, Hawai'i. September 1999.

Ke Aupuni Lokahi. *Moloka'i Enterprise Community Annual Report.* Moloka'i, Hawai'i. 2002.

Loomis, J.B. and White, D.S. "Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis." *Ecological Economics.* 1996.

MacKenzie, Melody Kapilialoha. *Native Hawaiian Rights Handbook*. Honolulu, Hawai'i. 1991.

Map, Hawaiian Islands. Nelles Verlag, Federal Republic of Germany.

Matsuoka, Jon, Davianna McGregor and Luciano Minerbi. "Molokai: A Study of Hawaiian Subsistence and Community Sustainability." In *Sustainable Community Development: Studies in Economic, Environmental, and Cultural Revitalization*. Marie Hoff, ed. Honolulu, Hawai'i. 1998.

The Maui News. "Residents Say No to National Parks." August 24, 2001.

Morgan, Joseph R. *Hawai'i, A Unique Geography*. Bess Press, Honolulu, Hawai'i. 1996.

Santo, Lance. Hawai'i Agricultural Research Center. *Assessment and Improvement Recommendations for the Molokai Irrigation System.* Honolulu, Hawai'i. 2001. http://www.hawaiiag.org/hdoa/leg2002/ADCannual2001.pdf

Shulstad, Robert N., and Herbert H. Stoevener. "The Effects of Mercury Contamination in Pheasants on the Value of Pheasant Hunting in Oregon." *Land Economics*. February 1978.

Spalding III, Philip. *Moloka'i*. Westwind Press, Honolulu, Hawai'i. 1983.

State of Hawai'i. *Governor's Molokai Subsistence Task Force Final Report*. Honolulu, Hawai'i. June 1994.

State of Hawai'i, Department of Business, Economic Development & Tourism. *The Hawai'i Input-Output Study: 1992 Benchmark Report.* Honolulu, Hawai'i. December 1998.

State of Hawai'i, Department of Business, Economic Development & Tourism. *The State of Hawai'i Data Book, A Statistical Abstract.* Honolulu, Hawai'i. Annual.

State of Hawai'i, Department of Land and Natural Resources. "Conservation District." Hawai'i Administrative Rules, Title 13, Subtitle 1, Chapter 5. Honolulu, Hawai'i.

State of Hawai'i, Department of Land and Natural Resources. "Indigenous Wildlife, Endangered and Threatened Wildlife, and Introduced Wild Birds." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Part 2, Wildlife, Chapter 124. Honolulu, Hawai'i.

State of Hawai'i, Department of Land and Natural Resources. "Rules for Hawai'i Statewide Trail and Access Program." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Part 3, Na Ala Hele, Chapter 130. Honolulu, Hawai'i.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Activities within Forest Reserves." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Chapter 104. Honolulu, Hawai'i. October 1993.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Game Bird Hunting, Field Trials and Commercial Shooting Preserves." Hawai'i Administrative Rules, Title 13, Chapter 122. Honolulu, Hawai'i. November 1999.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Game Mammal Hunting." Hawai'i Administrative Rules, Title 13, Chapter 123. Honolulu, Hawai'i. November 1999.

State of Hawai'i, Department of Land and Natural Resources. "Rules Regulating Wildlife Sanctuaries." Hawai'i Administrative Rules, Title 13, Chapter 125. Honolulu, Hawai'i. 1981.

State of Hawai'i, Department of Land and Natural Resources. "State Parks." Hawai'i Administrative Rules, Title 13, Subtitle 6, Chapter 146. Honolulu, Hawai'i. June 8, 1999.

State of Hawai'i, Department of Land and Natural Resources. "Threatened and Endangered Plants." Hawai'i Administrative Rules, Title 13, Subtitle 5, Forestry and Wildlife, Part 1, Forestry, Chapter 107. Honolulu, Hawai'i. May 15, 1997.

State of Hawai'i, Department of Land and Natural Resources. Na Ala Hele Trail and Access System. "Molokai Forest Reserve Road." April 18, 2002. http://www.hawaiitrails.org/trail.asp?TrailID=MO+03+011&island=Molokai

State of Hawai'i, Department of Land and Natural Resources, Division of Forestry and Wildlife. *Report to the Twenty-first Legislature Regular Session of 2002 Hawai'i Statewide Trail and Access System known as "Na Ala Hele."* November 2001.

State of Hawai'i, Department of Land and Natural Resources, Division of Forestry and Wildlife. *Annual Report to the Twenty-first Legislature Regular Session of 2002 Natural Area Reserves System and Natural Area Partnership Program.* November 2001.

State of Hawai'i, Department of Transportation. *Moloka'i Long-Range Land Transportation Plan.* Honolulu, Hawai'i. February 1997.

State of Hawai'i, Department of Transportation. *Statewide Transportation Improvement Program, Fiscal Years 2002, 2003 and 2004.* Honolulu, Hawai'i. October 2001. http://www.state.hi.us/ dot/stp/stip/stip_report.pdf

State of Hawai‘i, Office of Environmental Quality Control. “A Guidebook for the Hawai‘i State Environmental Review Process.” Honolulu, Hawai‘i. October 1997.

State of Hawai‘i, Office of Environmental Quality Control. “Content Guidelines for Biological Surveys, Ecosystem Impact Analysis.” Honolulu, Hawai‘i. August 11, 2000.

State of Hawai‘i, Office of Environmental Quality Control. “Definitions.” Honolulu, Hawai‘i. August 11, 2000.

State of Hawai‘i, Office of Environmental Quality Control. “The Environmental Notice.” Honolulu, Hawai‘i. Monthly.

Stearns, Harold T. *Geology of the State of Hawai‘i.* Pacific Books, Palo Alto, California. 1966.

Supreme Court of the United States, Opinion 94-859. *Bruce Babbitt, Secretary of the Interior, et al., Petitioners v. Sweet Home Chapter of Communities for a Great Oregon, et al.* June 29, 1995.

The Nature Conservancy of Hawai‘i. “A Community Protects its Natural Resources: The East Moloka‘i Watershed Partnership.”http://nature.org/wherewework/northamerica/states/hawaii/preserves/art2361.html

The Nature Conservancy of Hawai‘i. “Hawai‘i Conservation 2000 – Taking Broad Strides to achieve our mission.”http://nature.org/wherewework/northamerica/states/hawaii/news/news544.html

U.S. Court of Appeals, Tenth Circuit. *New Mexico Cattle Growers Association, et al v U.S. Fish and Wildlife Service*. No. 00-2050. Filed May 11, 2001.

U.S. Department of Agriculture, Soil Conservation Service in cooperation with The University of Hawai‘i Agricultural Experiment Station. *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawai'i.* Washington, D.C. August 1972.

U.S. Department of Agriculture, Natural Resources Conservation Service. “Program FAQ’s.” April 18, 2002. http://www.nrcs.usda.gov/faq/programs_faq.html#program1

U.S. Department of Agriculture, Rural Development, Office of Community Development. *Rural Empowerment Programs.* March 2002. http://www.ezec.gov/communit rurempowprogguide.pdf

U.S. Department of Agriculture, Rural Development, Office of Community Development. “Rural Empowerment Zone and Enterprise Community Program.” April 2002. http://www.ezec.gov

U.S. Department of Agriculture, Rural Development, Office of Community Development. “Molokai Enterprise Community.” April 18, 2002. http://www.ezec.gov/Communi/molokai.html

U.S. Department of Agriculture, Rural Development, Office of Community Development. “Molokai EC Funding Report February 2002.”http://www.ezec.gov/Community_Funding/molokaifunding.html

U.S. Department of Defense, Pacific Disaster Center. Disaster Information. April 18, 2002. http://www.pdc.org/

U.S. Department of the Interior, Fish and Wildlife Service, and National Marine Fisheries Service. *Consultation Handbook, Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act* (Final) March 1998.

U.S. Department of the Interior, Fish and Wildlife Service, Division of Economics. *1996 National and State Economic Impacts of Wildlife Watching, Based on the 1996 National Survey of Fishing, Hunting and Wildlife-Associated Recreation*. Arlington, Virginia. April 1998.

U.S. Department of the Interior, Fish and Wildlife Service, Pacific Region. *Recovery Plan for the Multi-Island Plants,* Portland, Oregon. July 1999.

U.S. Department of the Interior, Fish and Wildlife Service. *1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation Hawai'i.* FHW/96-HI. March 1998.

U.S. Department of the Interior, Fish and Wildlife Service. *Endangered and Threatened Wildlife and Plants: Determinations of Whether Designation of Critical Habitat is Prudent for 20 Plant Species and the Proposed Designations of Critical Habitat for 32 Plant Species from the Island of Moloka'i, Hawai'i; Proposed Rule.* Federal Register, 50 CFR Part 17. December 29, 2000.

U.S. Department of the Interior, Fish and Wildlife Service. *Endangered and Threatened Wildlife and Plants: Revised Determinations of Prudency and Proposed Designations of Critical Habitat for Plant Species From the Island of Moloka'i, Hawai'i; Proposed Rule.* Federal Register, 50 CFR Part 17. April 5, 2002.

U.S. Department of the Interior, Fish and Wildlife Service. *Federal Aid in Wildlife Restoration (Pittman-Robertson)*. August 28, 2000.

U.S. Department of the Interior, Fish and Wildlife Service. *Palila Recovery Plan.* Honolulu, Hawai'i. January 23, 1978.

U.S. Department of the Interior, Fish and Wildlife Service, State of Hawai'i Department of Land and Natural Resources, and Puu o Hoku Ranch. *Safe Harbor Agreement for the Reintroduction of the Nene to Puu o Hoku Ranch, Island of Moloka'i.* 2001.

U.S. Department of the Interior, National Park Service. *Hawai'i Area Studies, Public Law 105-355, Section 511.* August 2000.

U.S. Department of the Interior, National Park Service. "Kalaupapa National Historical Park." April 18, 2002. http://www.nps.gov/kala/index.htm

U.S. Department of the Interior. National Park Service. "The National Park System Caring for the American Legacy." April 18, 2002. http://www.nps.gov/legacy/mission.html

U.S. District Court for the District of New Mexico. *Middle Rio Grande Conservancy District v. Bruce Babbit.* No. CIV 99-870, 99-872 and 99-1445M/RLP (consolidated).

U.S. Federal Communications Commission. "Universal Licensing System." April 18, 2002.

U.S. Office of Management and Budget, The White House. "Circular No. A-94, Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs." October 29, 1992.

U.S. Office of Management and Budget, The White House. "Executive Order 12866, Regulatory Planning and Review." September 30, 1993.

U.S. Office of Personnel Management. 2002 General Schedule Salary Table. 2002.

University of Hawai'i, Department of Urban & Regional Planning. *Contemporary Subsistence Lifestyles in Hawai'i: Implications for State Policy. Part II: Conference Proceedings.* Honolulu, Hawai'i. 1985.

Young, John S., Dennis M. Donnelly, Cindy F. Sorg, John B. Loomis, and Louis J. Nelson. "Net Economic Value of Upland Game Hunting in Idaho." *USDA Forest Service Resource Bulletin RM-15.* Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. 1986.

Information was provided in communications with representatives of:

Government

- County of Maui, Planning Department
- County of Maui, Department of Public Works and Waste Management
- County of Maui, Department of Finance, Real Property Tax Division
- County of Maui, Board of Water Supply
- Hawai'i Department of Agriculture
- Hawai'i Department of Hawaiian Homelands
- Hawai'i Department of Land and Natural Resources, Commission on Water Resource Management
- Hawai'i Department of Land and Natural Resources, Division of Forestry and Wildlife
- Hawai'i Department of Land and Natural Resources, Na Ala Hele Trail and Access Program
- Hawai'i Department of Land and Natural Resources, Natural Area Reserves Program
- Hawai'i Office of Environmental Quality Control
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture, Federal Farm Service Agency
- U.S. Department of Agriculture, Natural Resources Conservation Service
- U.S. Department of the Navy
- U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office
- U.S. Department of Interior, National Park Service, Kalaupapa National Historical Park

Private

— Aeronautical Radio Inc.
— Decision Analysts, Hawai‘i, Inc. (DAHI)
— Industrial Economics, Inc
— Maui Electric Company, Inc.
— Moloka‘i Ranch, Ltd.
— Pu‘u o Hoku Ranch

Non-profit

— Earthjustice Legal Defense Fund
— Hawai‘i Agriculture Research Center
— Moloka‘i Community Service Council
— The Nature Conservancy of Hawai‘i
— The Trust for Public Land